RAILROAD GAZETTE

FRIDAY, AUGUST 30, 1901.

CONTENTS

Contributions

Coals to Newcastle.

Standard Railroad Signal Co.,
Troy, N. Y., Aug. 22.

TO THE EDITOR OF THE RAILROAD GAZETTE.

I see in the issue of the *Railroad Gazette* of Aug. 16, page 572, a notice of the opening of a pneumatic interlocking plant on the London & South Western Ry. of England, which is an interesting item of news, I think, principally for the reason that it is only about 25 years ago that the first interlocking plant for this country was shipped from England. Now, in 1901, the plant referred to on the London & South Western at Grately was built in this country at our works and shipped to England last winter for installation.

A. H. RENSHAW.

The Euston Station—Corrections.

Mount Vernon, N. Y., Aug. 21, 1901.

TO THE EDITOR OF THE RAILROAD GAZETTE.

In your impression of Aug. 2, page 541, is an interesting and well-written description of the London & North Western Railway Station at Euston Square, which I have just read with much pleasure. It contains a few small errors, which it may be worth while to correct.

By the construction of the sentence in the second column, beginning at the ninth line from the bottom, we are led to believe that the King's Cross Station is the terminus of the Midland Railway, and St. Pancras that of the Great Northern Railway; but the fact is the reverse.

In describing the statues of the two Stephenson's (third column) we are informed that "the road to which the station belongs is in fact but a development of the Stockton & Darlington line over which the 'Rocket' made its triumphant runs." The Stockton & Darlington Railway was amalgamated with the North Eastern Railway in 1863, and has no connection with the London & North Western. By "triumphant runs" it is presumed the writer refers to the competitive engine trials held at Rainhill on the Liverpool & Manchester Railway in 1829, when Stephenson's "Rocket" was adjudged the winner. The Liverpool & Manchester line is now a part of the London & North Western system.

HERBERT T. WALKER.

The M. C. B. Brake-Shoe Tests.

Chicago, Aug. 23, 1901.

TO THE EDITOR OF THE RAILROAD GAZETTE.

I had two objects in presenting my ideas concerning the report of the Master Car Builders' brake shoe committee in the columns of your paper. First, to bring out in as clear a light as possible the result of an inspection of the shoes tested, as shown by their fractures exhibited at the convention; to the end that the committee's report might be properly interpreted. Second, to state the facts of the case as they appeared to the writer for the purpose of provoking discussion and bringing out the views of those interested in the brake-shoe question. Especially was it desired to secure an expression from the manufacturers.

Mr. L. M. Slack, General Manager of the Drexel Railway Supply Co., in your issue of Aug. 16, takes exception to some of my remarks concerning the Cardwell shoe. In my contribution in the *Railroad Gazette* of July 12, I stated that certain shoes had been made for test; that is, certain shoes were taken from a sample lot, supplied a railroad for test and by that road turned over to Mr. Bush for test. In confirmation of this statement I quote the following from the remarks which Mr. Bush made in discussing the report: "The shoes known as the Lappin and the Cardwell were presented direct to the chairman of the committee and he presented them as coming from the Chicago, Milwaukee & St. Paul road." (See the *Railroad Gazette*, July 5, 1901.) Mr. Slack also confirms my statement, which was made to clearly distinguish the shoes noted, from others which were selected at random by disinterested parties, from railroad stock, without knowledge of the maker. I have no intention of implying bad faith to the committee nor any desire to place the brake-shoe makers in a bad light.

The only reason I am playing solitaire, as Mr. Slack facetiously expresses it, in discussing the records, is because certain of the brake-shoe makers keep silence, preferring to have the original report go unchallenged, agreeing, doubtless, with Mr. Slack, who says: "Instead of instituting any elaborate post mortems, would it not be well to concede the validity of the M. C. B. report?" I answer, most certainly it would; provided there is added to the M. C. B. report a complete description of each of the shoes tested as regards its structure and relative hardness of the bearing face. Otherwise the report of the committee is unfair. The mere trade name of the brake-shoe does not signify anything.

It should not be forgotten that the M. C. B. report will be the basis for much argument, as to the relative merits of the shoes in question, and unless the premises are correctly stated the conclusions can be of little value. I have heard that my letters, in the *Railroad Gazette* have resulted in a better understanding of the report and the brake-shoe question generally, which was the first reason for their publication. Mr. Slack's response is very acceptable, as giving his side of the question, although if he would throw a little more light upon the peculiar performance of the Cardwell shoes it would be welcome.

In the same way it is up to the other manufacturers to criticize the report and my letters, giving their views on the question, so that there will result a clearer understanding all around of a subject which has so much to do with the safety and economy of railroad operation.

F. W. SARGENT.
Managing Engineer The American Brake Shoe Co.

American Methods on British Railroads.

There is a great deal of talk, and a certain amount of action, just now in the direction of introducing American methods in the working of British railroads, the motive being to reduce working expenses. The Board of Trade returns for 1900 show that the ratio of working expenses to receipts for the United Kingdom in that year was 62 per cent., as compared with 59 per cent. for 1899, 58 per cent. for 1898, 57 per cent. for 1897 and 56 per cent. from 1894 to 1896. The abnormal price of coal last year is, of course, accountable for much of the increase; but, although the cost of fuel has now sunk to a more normal level, the situation still gives rise to considerable alarm, the more so as receipts are falling off on nearly all lines. Comparisons with the prosperous reports of leading American roads have, accordingly, created a strong demand in the stockholders' interest for the adoption of American practices, and already some small, but significant results of this movement have been realized.

The last week or so, for instance, has seen the opening of the first low-pressure, pneumatic interlocking plant on an English railroad, and on a Scotch line the running of the first trains of 30-ton freight cars, hauled by a locomotive with 2,500 sq. ft. of heating surface, and equipped throughout with the Westinghouse quick-acting brake. Whether or not the movement in favor of larger cars will take hold in Great Britain is a very open question; and whilst several roads are experimenting with wagons of 30, and even 50-tons capacity, the Chairman of the Great Eastern told the stockholders at their half-yearly meeting the other day that he had no faith in the success of such an experiment, so far as that line was concerned, there being only one place on the system where single consignments of 30 tons were put on the road. But this same Chairman declared his faith in larger locomotives for freight traffic, and this may be said to be a movement common to all British railroads, though it means considerable expenditure in the extension of sidings to accommodate the longer trains. The new Caledonian Railway locomotives, just referred to, are the latest example of this development. They have eight coupled wheels, 4 ft. 6 in. in diam. and 21-in. cylinders, with a piston stroke of 26 in. Probably they have more tractive power than any other locomotive running in Great Britain.

As regards the low-pressure pneumatic signaling, the pioneer company is the London & South Western, which has just put down a 72-lever plant at a small junction station on its main line. [*Railroad Gazette*, Aug. 16, p. 572]. This, however, is not the first power plant to be installed in England, as the Great Eastern has for several years had one of its London freight yards controlled by a Westinghouse electro-pneumatic installation, and the London & North Western has its own electric (Webb-Thompson) system in use in several cabins at Crewe.

More complete novelty attaches to the automatic block signals which the London & South Western is putting down in connection with the pneumatic interlocking plant. Both installations are being done by the newly-constituted British Pneumatic Signal Co., which Mr. John N. Beckley has founded in London in connection with Mr. John P. O'Donnell, of Evans, O'Donnell & Co., signal engineers. The automatic signals are to be operated by track circuits working in conjunction with the pneumatic plant, and a section of six miles is being fitted, with one-mile "blocks." Simultaneously, an endeavor is being made to introduce the "Hall" track-circuit system of automatic signals into the United Kingdom, the Hall Company having recently opened a London office under the charge of Mr. H. Raynor Wilson, lately signal superintendent of the Lancashire & Yorkshire.

Another American method to which a trial has lately been given in England is the system of registering and checking passengers' baggage. This was introduced on the Great Eastern during the months of May and June, this year. The Chairman of the Company has announced the failure and abandonment of the experiment. Only 63 packages were registered in the two months, the receipts being 15s. 9d.

In regard to London's rapid transit problem America is to the fore in the person of Mr. Charles T. Yerkes, of Chicago, who is interesting himself in (1) the electrification of the old "underground" lines—the District and the Metropolitan; (2) the construction of a deep-level "tube" from Charing Cross to Hampstead, and (3) the promotion of a number of surface tramways. Before the electrification of the Inner Circle (which is owned partly by the Metropolitan and partly by the District) can be proceeded with the Board of Trade has to arbitrate between the merits of the Ganz system, which is favored by the Metropolitan and what is loosely called the "Yerkes system," to which the District Company has pledged itself. Meantime, the Central London Co. has found its electric locomotives too severe on the permanent way, and is experimenting with motors supplied by the General Electric Co. The Central London has just declared a 4 per cent. dividend as the result of its first complete six months working.

The new "tube" schemes promoted as the result of the success of the Central London have been exhaustively considered by a committee of the two Houses of Parliament, which, however, has reported too late for any further progress to be made this session. The report is, on the whole, favorable to the schemes; but attention is called to the American system of constructing subways, or shallow tunnels, and the London County Council is sending its engineer to New York to inquire into the advantages of this method as compared with deep-level lines.

But whilst following or watching American practice in these various ways, the English railroad world has a novelty all its own. This is Mr. Behr's scheme for a high-speed electric mono-rail line between Liverpool & Manchester, which has just received the sanction of Parliament, subject to the detailed plans being submitted to the Board of Trade and approved by that authority before the work of construction is commenced. This scheme was for three weeks before a committee of the House of Commons and for another three weeks before a committee of the Lords, and most of the leading civil and electrical engineers of the Kingdom gave evidence on the one side or the other. The speed expected to be attained is 110 miles an hour, and the time taken in covering the 35 miles between the two cities is to be reduced, if the inventor's hopes are realized, from 45 to 20 minutes. The scheme has been carried through Parliament in the teeth of strenuous opposition.

CHARLES H. GRINLING.

LONDON, August 7.

Am. Soc. C. E. Committee on Rail Sections.

At the annual convention, June 25, the Board of Direction presented the following report on the proposition that a Special Committee on Standard Rail Sections be appointed.

Arguments in Favor:

1—The American Society of Civil Engineers has already recognized this subject as a proper one for consideration and report by a Special Committee.

2—The Special Cmmittee, thus authorized, became convinced that experience in the use of steel rails had reached a stage at which standard patterns were not only feasible but desirable, and, accordingly, in August, 1893, recommended a series of rail sections for given weights per yard.

3—The result of the report of the Special Committee may be indicated by these two facts: *First*, that in February, 1881, the rail mills in this country had 188 different patterns which were considered standard, and that 119 patterns of 27 different weights per yard were regularly manufactured; *Second*, that in 1899, or six years after the publication of the report of the Special Committee, fully 75 per cent. of all the rails rolled in the

United States were of the pattern recommended in that report.

4—It would seem, therefore, that a suggestion that these sections are in any respect unsatisfactory should not be disregarded, for if the sections now recognized as Standard are to be modified in any respect, such modification should have an endorsement of significance equal to that given to the original sections.

5—To investigate and report upon engineering matters which are of general interest to the profession, is a distinctly proper function of this Society. It is submitted that a report from a Special Committee on Rail Sections should summarize the present state of the art of railmaking, and cover an investigation of all questions relating thereto, whether of section, composition of the material, or processes of manufacture, and that such a report, whether it recommended a change in any of the sections heretofore established or not, would be of great value.

Arguments Against:

1—The rail sections recommended by the Special Committee of the Society in 1893, have been very generally adopted, and are now recognized as standard.

2—Well-established standards should not be questioned without good reason, and no special committee should be appointed to reconsider the present standard sections unless upon evidence that a change of section is necessary or advisable.

3—No such evidence has been placed before the Society or the Board of Direction.

4—In any case, it does not appear that a Special Committee, if appointed, should be limited by its instructions to the consideration of proposed changes in section alone, as questions of composition and manufacture may be quite as influential in any failure of the present standard sections to meet requirements which may be demonstrated.

Recommendation:

After careful consideration, the Board of Direction, believing that the reasons in favor of the appointment of the proposed Committee outweigh those against such appointment, makes the following recommendation:

That a Special Committee be appointed, as provided in the Constitution of the Society, for the following purposes:

1—To report upon the results obtained in the use of rails of the sections presented to the Society in annual convention, Aug. 2, 1893, by a Special Committee appointed for that purpose.

2—To report whether any modification of any of said sections is advisable, and if so to recommend such modification.

3—To report upon the recognized practice as to chemical composition and mechanical treatment used in the manufacture of rails, and the manner of inspection of the same.

4—To report upon the advisability of the establishment of a form of specification covering the manufacture and inspection of rails.

5—If found advisable, to recommend a form of specification for the manufacture and inspection of rails.

An editorial article on this subject appears on another page.

Schenectady Four-Cylinder Tandem Compound Locomotives—Classes Y-2 and Y-3, Northern Pacific Railway.

[WITH AN INSET.]

Early in 1900 the Schenectady Locomotive Works began designing a four-cylinder tandem compound consolidation locomotive for the Northern Pacific Railway Company. Locomotive No. 17, the first of its kind, was delivered in the latter part of that year. After some months of service tests under the direction of Mr. Alfred Lovell, Superintendent of Motive Power of the Northern Pacific, 26 more of these locomotives were ordered, with some minor changes of design which experience in the service tests dictated.

The first locomotive had piston valves for the high pressure cylinders and separate steam chests with balanced D-valves for the low-pressure cylinders. The other 26 engines have piston valves for all cylinders and the valve chambers are continuous from the high pressure to the low-pressure cylinders. This point will be explained later in referring to the illustrations.

The locomotives are of two classes: Y-2, of which there are 12 delivered, beside the original locomotive No. 17; and Y-3, of which there are 14 locomotives for heavy mountain work now being delivered by the American Locomotive Company. The class difference is in those features that fit Class Y-3 for heavier and slower work than is required of Class Y-2. The differences in weight, heating surface, driving parts and tractive power are here tabulated for easy comparison.

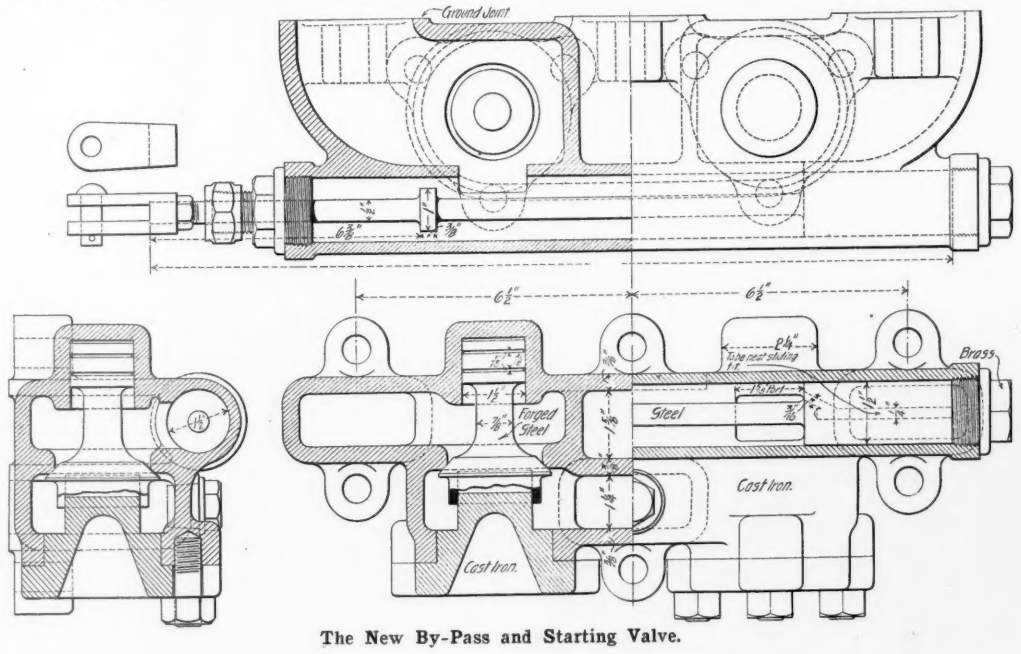
Relative Proportions of N. P. Locomotives.

	Class Y-2.	*Class Y-3.*
Weight in working order, lbs.	198,000	210,000
Weight on driving wheels, lbs.	175,000	186,000
Weight on engine truck, lbs..	23,000	24,000
Diam. of driving wheels, in...	63	55
Cylinder diam. and stroke, in.	15 & 28 x 34	15 & 28 x 34
Working steam pressure, lbs..	225	225
Outside diam. of boiler, first ring, in.	66½	74¾
Total heating surface, sq. ft..	2,997.10	3,669.38
Grate area, sq. ft. in.....	52.30	52.30
Depth of fire-box.....F. 70¾; B. 59¾	F. 77¼; B. 64½	
Maximum tractive force, lbs.	40,000	45,900

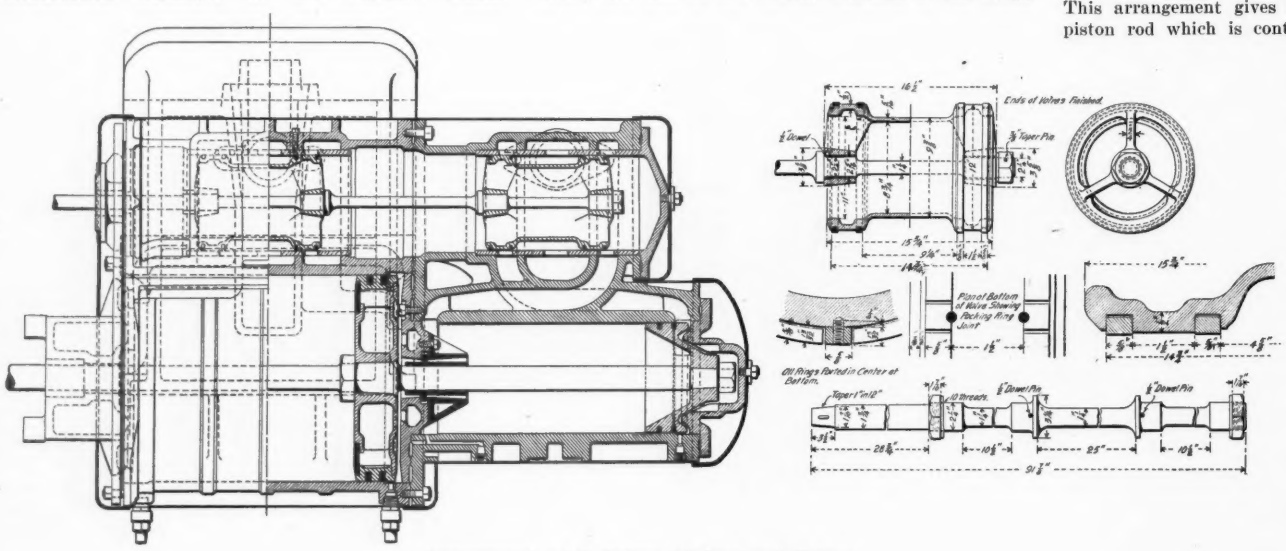
The foregoing dimensions put these locomotives well up in the list of weight and size of modern locomotives and, having recently seen two of the Class Y-3 ready for delivery, we may add that symmetry has not been sacrificed and the net impression from a general view is that of well considered compactness. The illustrations given on an inset and elsewhere in this issue are of engine No. 1,252, Class Y-2. There is nothing especially new in the design except the compounding features and closely allied parts. We shall, therefore, note only a few points in the general design and give greater attention to the valves, cylinders and steam circulation in these parts.

The frames are cast-steel and the rails are of general rectangular section. They are well bound together transversely and also in the vertical relations of the frame rails. The several webbed filling pieces and hanger brackets that contribute to this effect are shown in the general elevation of the engine. A broad bar cross-tie on the lower frame rails receives the trailing end of the truck frame and the pin. There is also a bar tie shrunk across the upper rails back of the saddle and the cast-steel base for the forward expansion pad makes a cross-tie immediately ahead of the fire-box. This expansion pad casting has a brass sole-plate riveted in the bottom of it, which gives easy movement in expansion and affords means of taking up wear without renewing the cast-steel parts. The fire-box is wide and well above the frames and the grates slope forward. The back expansion plate is fastened to a lip that is milled out of the solid mud ring. The total wheel base is 26 ft. 2 in. and the distance from the center of the No. 1 driving axle to the center of the engine truck axle is 9 ft. 2 in. The engine truck wheels are 33 in. in diam. and the truck carries 23,000 lbs., which is equalized back in series to the No. 1 and No. 2 driving wheel springs.

There is but one engine saddle, which carries all cylinders and valve chambers. The low-pressure cylinders and their valve chambers are cast integral with the half-saddle castings. The high-pressure cylinders and their valve chambers are cast as separate units for the respective sides and are bolted to the front heads of the low-pressure cylinders and by flanged joint to the low-pressure valve chambers. A composite cylinder head is used between the high and low-pressure cylinders, serving as a back high-pressure head and a front low-pressure head. The flanged joints of the valve chambers make of them a continuous receiver chamber in which the high-pressure and low-pressure valves are mounted on a valve stem which is continuous and common to both valves. There is, therefore, no separate receiver, as these chambers are at once steam chests for the low-pressure cylinders and exhaust receivers for the high-pressure cylinders. There is a brass extension on the back high-pressure cylinder head, extending forward into the cylinder. The bore of this brass piece is sharply flared forward; the bore through the cylinder head is correspondingly flared backward and an unpacked brass sleeve 8 in. long is seated between them. The sleeve has an exterior ground-joint collar at one-third its length and there are oil grooves in the bore, as illustrated. It carries the high-pressure length of piston rod and is a neat sliding fit on the rod with room to adjust vertically in the groove between the cylinder head proper and the brass extension. This arrangement gives flexibility in alignment of the piston rod which is continuous for both pistons. The high-pressure piston is concaved to accommodate the sleeve, and likewise the front cylinder head is concaved.



The New By-Pass and Starting Valve.



Arrangement of Cylinders, Pistons and Valves.

Alligator crossheads are used and the guides are arranged so the pistons can be drawn out and examined without removing the low-pressure piston from the rod. In this connection attention is invited to the detail illustrations of the guides, guide yoke and pistons. From these it may be seen that in the Class Y-2 engines there is a removable plate covering an opening large enough to pass the guides and crosshead complete, fastened with four bolts to the back of the guide yoke, and that the back guide blocks are attached to this plate. To remove the pistons the front high-pressure head is taken off and the high-pressure piston drawn from the piston rod. The back low-pressure head and the guide yoke plate are loosened without disturbing the relations of guides and crosshead, and by disconnecting the back end of the main rod, the rod, guides, crosshead and piston are drawn back until the low-pressure piston is withdrawn. When the low-pressure piston only is to be examined the high-pressure head is not disturbed. Put-

ting the engine on the back center and sliding back the low-pressure back head and guides gives access to the follower bolts and packing rings without taking down the main rod. In the Class Y-3 engine this arrangement is modified. The guides are entirely open at the back end and slightly longer.

The high-pressure pistons are cast-iron with 3/8-in. snap rings. The low-pressure pistons have cast-steel spiders enclosed in lipped cast-iron bull rings retained by follower rings. The bull ring completely encases the circumference of the cast-steel spider and takes all contact with the cylinder bore. Cast-iron snap rings 3/4 in. wide and having 1/8-in. oil grooves in their bearing surface are used in the bull ring. There is a good feature in the cast-steel spider. Recesses are cast in the arms of the spider and in them are placed removable anchor brasses, threaded to receive the follower-ring bolts. This will doubtless save twisting off follower bolt heads in removal. The follower bolt arrangement is Northern Pacific standard.

The synopsis of what has thus far been said of these parts is that, taking the engine saddle as the base of support for steam-acting parts, the high-pressure cylinders and valve chambers stand as extensions of the low-pressure parts and with the continuous piston rods and valve rods give a very simple and direct forecast of operation.

The steam supply and valve arrangements are out of the ordinary and very interesting. We have illustrated in detail the exterior steam pipes, the valves, pistons, relief and by-pass valves, and a study of them may be profitable in connection with what follows. The interior of the front end, its T-joint and steam pipes, are ordinary. The high-pressure valves have inside admission, and the low-pressure valves have outside admission. Both sets of valves are 12 in. in diam., very light, hollow cast-iron bodies with cast-iron snap rings 5/8 in. wide. They have 7/8-in. steam lap for both cylinders and are set line and line in full gear for both motions. There is 1/4-in. exhaust clearance in the high-pressure valve and 3/8-in. in the low-pressure valve. The lead at half stroke is about 1/4 in. A valve setting card appearing herewith gives full information about the setting of valves of engine No. 1,250, one of Class Y-2.

Valve-Setting of Northern Pacific Engine No. 1250.

No. of Notches.	Lead. Front Stroke.	Lead. Back Stroke.	Valve Opens. Front Stroke.	Valve Opens. Back Stroke.	Cut Off. Front Stroke.	Cut Off. Back Stroke.
Left.	0	0	2 1/4"	2 1/16"	30 3/4"	30 5/8"
Right.	0	0	2 1/8"	2 1/16"	30 3/8"	30 1/2"
2	3/16"	3/16"	1 5/8"	1 5/8"	25"	25 1/8"
3	7/32"	7/32"	25/32"	25/32"	23"	23 3/16"
4	1/4"S*	1/4"S	11/16"	11/16"	21"	21 1/8"
5	1/4"	1/4"	5/8"	5/8"	19"	19"
6 Left.	5/32"	5/32"	9/16"S	9/16"	17"	17"
6 Right.	5/32"	5/32"	9/16"S	9/16"S	17"	17"

Note: Set for line and line both motions. Lead, 5/32 in. at 17 in. cut-off. Slip of link: Forward 1 13/16 in.; back, 1 1/16 ins.; half-stroke 5/8 in. Notch No. 1 is "the corner."
* "S"; scant.

Live steam comes to the high-pressure valve through a saddle cavity and the S-shaped exterior pipe which is shown in detail, and the connections of which are to be seen in the general sectional views of the engine. We have prepared a view showing longitudinal sections and part elevation of the cylinders and valve chambers, in which the pistons are shown at dead center ahead and the valves are set at line and line ready to admit. It should be noted that with one valve admitting inside and the other admitting outside and both valves driven by the same valve rod there must be a special relation of steam ports. The valve gear is ordinary. The eccentrics are on the main axle and the rocker arms are between the No. 1 and No. 2 drivers on the top rail of the frame. A motion bar passing over the No. 2 axle transmits the motion of the links. From the illustration it is apparent that the high-pressure ports are crossed; that is, the valve is set to open the back port in the valve seat, but steam will go to the head end of the cylinder. Meanwhile, the exhaust from the crank end of the high-pressure cylinder is free to pass out of the front port of the valve seat and through the body of the high-pressure valve into the common valve chamber and be admitted to the head end of the low-pressure cylinder, the valve of which stands ready to admit externally and is open to exhaust as in the ordinary locomotive.

Some of these engines have been fitted with the regular Schenectady by-pass valve on the low-pressure cylinders and some have not, but all are arranged to receive these valves if desired. The high-pressure cylinders have a combination by-pass and starting valve that is new. The low-pressure by-pass valve is so well-known as to require no explanation beyond what is given in the illustrations. The high-pressure by-pass valve is operated as a starting valve by the throw of the cylinder cock rods, this attachment to the rigging being shown in the half-tone illustration. In the detail drawings three circulating ports are shown, one to each steam port and one to the live steam chamber. The last-named opening is controlled by the plug head of the shifting rod which is shown set in open position. As illustrated, it establishes direct communication between the acting and exhausting ends of the high-pressure cylinder and the live steam supply; puts the high-pressure piston practically in equilibrium; and delivers high-pressure steam to the low-pressure cylinder. Of this increased pressure it should be said, however, that the size of the live steam port, 1 in. x 1 5/8 in., limits the supply of live steam to low-pressure cylinders so that if there is slipping of the wheels the excess pressure should be reduced by wire drawing through this small opening. There is also an excess pressure valve on the receiver chamber, and ordinary relief valves are used on the external steam pipes.

In drifting, the two gravity valves which are shown as part of the device come into action with dash-pot heads and bottoms. While the throttle is open these valves are seated upwardly by steam pressure. When it is closed they drop and go into effect steadily because of the dash-pot action of their top and bottom fittings. When they are open the front and back ports on the high-pressure cylinder are connected. We are informed that experience shows this device to be satisfactory. No tests, except those of the first experimental engine, have been made and, therefore, it does not seem advisable to give indicator cards or other data from those tests as a criterion for the operation of these engines, which have been somewhat modified in detail.

We are indebted to Mr. A. J. Pitkin, Vice-President of the American Locomotive Co., Mr. J. E. Sague, Mechanical Engineer, and Mr. F. J. Cole, Assistant Mechanical Engineer, for information about these locomotives. The descriptive specifications follow:

Descriptive Specifications of Northern Pacific Locomotive No. 1,252.

General Dimensions.

Gage ..... 4 ft. 8 1/2 in.
Fuel ..... Bituminous coal
Weight in working order ..... 198,000 lbs.
Weight on drivers ..... 175,000 lbs.
Wheel base, driving ..... 17 ft.
Wheel base, rigid ..... 17 ft.
Wheel base, total ..... 26 ft. 2 in.

Cylinders.

Diam. of cylinders ..... 15 in. and 28 in.
Stroke of piston ..... 34 in.
Horizontal thickness of piston ..... 5 1/2 in.
Diam. of piston rod ..... h.p. 3 in.; l.p. 3 3/4 in.
Kind of piston packing ..... Cast iron
Kind of piston rod packing ..... Jerome
Steam ports, width ..... h.p. 2 in.; l.p. 2 in.
Exhaust ports, width ..... l. p. 3 in.

Valves.

Kind of slide valves ..... h.p. 12 diam.; l.p. 12 diam.; piston type
Greatest travel of slide valves ..... 6 in.
Steam lap of valves ..... 7/8 in.
Exhaust clearance valves ..... h.p. 1/4 in.; l.p. 3/8 in.
Lead of valves in full gear,
Line and line F. & B.; 1/4-in. lead at 1/2-in. stroke cut-off
Kind of valve stem packing ..... Jerome

Wheels, Etc.

Diam. of driving wheels outside of tire ..... 63 in.
Material of driving wheels centers ..... Cast steel
Tire held by ..... Shrinkage
Driving box material,
Main, cast steel; intermed., F. & B., steeled cast iron
Diam. and length of driving journals,
Main 9 1/2 in. x 11 in.; others, 9 in. diam. x 11 in.
Diam. and length of main crank pin journals,
(Main side, 7 3/4 in. x 5 1/4 in.) 6 1/2 in. diam. x 7 in.
Diam. and length of side rod crank pin journals,
Intermediate, 5 1/2 in. x 5 in.; F. & B. 5 in. diam. x 4 1/4 in.
Engine truck, kind ..... 2-wheel swing bolster
Engine truck, journals ..... 6 in. diam. x 11 in.
Diam. of engine truck wheels ..... 33 in.
Kind of engine truck wheels ..... Boles steel tired

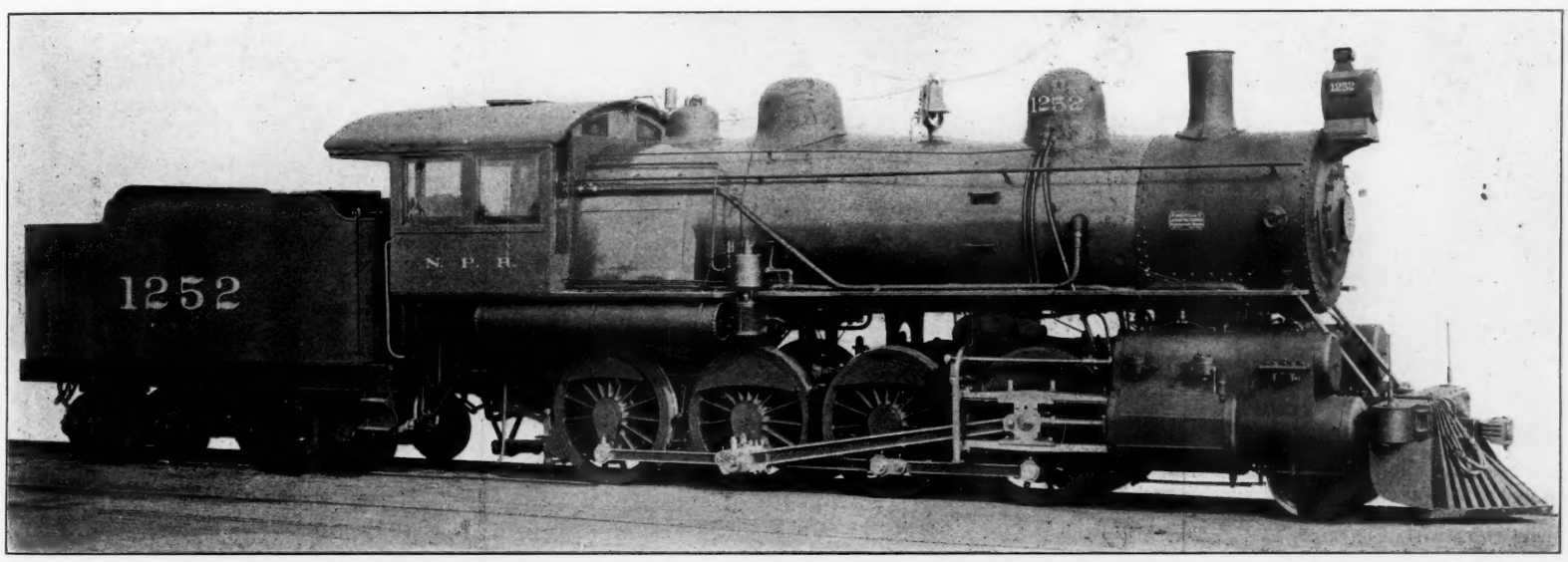
Boiler.

Style ..... Extended wagon-top with wide fire-box
Outside diam. of first ring ..... 66 1/2 in.
Working pressure ..... 225 lbs.
Material of barrel and outside of fire-box ..... Worth basic steel
Thickness of plates in barrel and outside of fire-box,
9-16 in., 3/4 in., 13-16 in. and 7/8 in.
Horizontal seams ..... Butt joint sextuple riveted, with welt strip inside and outside.
Circumferential seams ..... Double riveted
Fire-box, length ..... 100 1-16 in.
Fire-box, width ..... 75 1/4 in.
Fire-box, depth ..... F. 70 3/4 in.; B. 59 3/4 in.
Fire-box, material ..... Carbon acid steel
Fire-box, plates, thickness ..... Sides, 3/8 in.; back, 3/8 in.; crown, 7-16 in.; tube sheet, 9-16 in.
Fire-box, water space ..... Front, 4 1/2 in.; sides, 3 1/2 in. to 6 in.; back, 3 1/2 in. to 4 1/2 in.
Fire-box, crown staying ..... Radial 1 1/8 in. diam.
Fire-box, stay bolts ..... Taylor iron 1 in. diam.
Tubes, material ..... Charcoal iron No. 12
Tubes, number of 338
Tubes, diam. ..... 2 in.
Tubes, length over tube sheets ..... 16 ft.
Fire brick arch, supported on ..... Water tubes
Heating surface, tubes ..... 2,815.03 sq. ft.
Heating surface, water tubes ..... 26.43 sq. ft.
Heating surface, fire-box ..... 155.64 sq. ft.
Heating surface, total ..... 2,997.10 sq. ft.
Grate surface ..... 52.30 sq. ft.
Grate, style ..... Rocking, Ry. Co's. style
Ash pan, style ..... Hopper, with slides op. by steam cyl.; dampers front and back.
Exhaust pipes ..... Single
Exhaust nozzles ..... 5 1/4 in., 5 1/2 in., 5 3/4 in.
Smoke stack, inside diameter ..... 18 1/2 in. & 16 in.
Smoke stack, top above rail ..... 15 ft. 1/4 in.
Boiler supplied by
Two Hancock Inspirators, Type "A" No. 10 Pos. R. & L.

Tender.

Weight, empty ..... 47,000 lbs.
Wheels, number of 8
Wheels, diam. ..... 33 in.
Journals, diam. and length ..... 5 in. diam. x 9 in.
Wheel base ..... 15 ft. 8 in.
Tender frame ..... 10-in. steel channels
Tender trucks ..... 2 trucks, 4-wheel cen. bearing; double I-beam bolster.
Water capacity ..... Tank (water-bottom); 5,500 U. S. gallons
Coal capacity ..... 10 tons
Total wheel base of engine and tender ..... 53 ft. 10 1/2 in.

Following is a list of some of the special equipment used. Two air pumps are used only on the Class Y-3 engines in mountain service: Westinghouse-American combined brake on drivers, tender and for train; two 9 1/2-in. air pumps with duplex governors; Le Chatelier water brake on cylinders; three 3-in. Ashton special open pop safety valves; Little Giant blow-off cock; two Michigan lubricators, one double, one triple; Leach D-2 double track sander; magnesia sectional lagging; one Ashcroft steam gage; and the Western bell ringer.



Schenectady Four-Cylinder Tandem Compound Locomotive—Northern Pacific Class Y-2.

Correcting Six Years' Unjust Discrimination.

The British Railway Commission, on August 7, gave a judgment directing the Midland Railway to refund a small amount, apparently about 1/4 of 1 per cent. of the freight charges on each and every shipment of coal made by Charrington, Sells, Dale & Co., from their mines north of London to all points south of London, during the past six years, where the shipments of this firm had come into competition with those of Rickett, Smith & Co. A secret rebate of from 1 per cent. to 1 1/4 per cent. had been paid to the latter firm for many years, and the decision was on a complaint by C., S., D. & Co., who had discovered the arrangement by which their competitors were getting the better of them. The recovery by the plaintiff was limited to six years because of the statute of limitation. The railroad company claimed that the rebate to R., S. & Co. had not been secret, but the court disallows this claim. It was asserted that the low rate was made to meet the competition of coal carried to the south of England from mines in the north by sea, but the Commission finds

that this was only a part of the reason. The main point on which the railroad sought to justify itself was that R., S. & Co. were the only coal shippers who could do a sufficiently large business to effectually compete with the sea-borne coal. The three members of the Commission write three separate decisions, as they did not agree on all the details; and for this reason it is not easy, from the account before us, to make out just what they have decided; but the principal fact shown by the decision is that rebates are not deemed allowable under the English law, except where they are justified by public policy, while at the same time it seems that they are allowable, even though secret, if it is proved that they do promote the interest of the public. The Right Hon. Viscount Cobham, the third member of the Commission, says that "private contracts of this kind must inevitably tend towards the monopoly of trade by the more powerful firms." The rebate to R., S. & Co. was stopped by the road as soon as the knowledge of it became public.

Steel Railroad Ties in Europe.

BY FOSTER CROWELL, M. AM. SOC. C. E.; M. INST. C. E.

In this country the steel tie is in eclipse. Whether it will ever reappear under new conditions is at least doubtful. Certainly it is not suited to the present track requirements here. The verdict of American roads on which steel ties have been tried may be found embraced in the following statements contained in letters received recently from two of the best qualified men I know, narrating what have been the ultimate results of the metal tie experiments on two of "America's Greatest Railroads" (with apologies to Mr. George H. Daniels for the impious suggestion that there is more than one such).

On one of them*, the latest experiments were with two types of steel ties, both laid on main track, on tangents, with stone ballast and 100-lb. rail; "of the one type, which weighed 86 lbs. and cost $2.50 each, 1,300 were placed in track in the summer of 1896 and removed during the summer of 1899 after an unsatisfactory service of three years under about 250 trains a day. They failed by crushing and breaking under the rails; they were of a shape that interfered with the preservation of alignment without destroying the surface, and the cost of lining and surfacing was several times that of the cost to maintain similar tracks laid with ordinary (wood) ties." Of the other type "weighing 140 lbs. and costing $3.11 each, 720 were placed in track in 1889 and removed in 1899 after about 10 years service of about 50 trains per day. They gave better satisfaction than the first type, above described, but were unsatisfactory as regards holding the track in line and surface, especially the former. . . . My opinion is that no metal tie has yet been designed which does not possess the serious objection of failing to properly adhere to the ballast, and it seems doubtful that any will be made, consistent with reasonable first cost, which will become identified with the roadbed to such an extent as to give stable track."

On the other† of the two railroads, experiments extended over a number of years with this result, viz., "our decision in the matter was that under no circumstances would we use a metal tie; that is a tie composed purely of metal, and the combination of metal with other materials has not been satisfactory. . . . The fact is, there does not seem to be any necessity for a metal tie, as there is no indication of wood being exhausted. Wood is the most fortunate material for a cross tie, inasmuch as it forms a cushion (which is very necessary under the rail) and eliminates to a degree the great trouble we have with expansion and contraction of metal. *It also enables us to use with safety* the automatic electric signals, which are so valuable and, we might say, indispensable, in operating a railroad. A metal tie connects the current between the rails and destroys this system of signaling. . . . I do not think the metal tie subject is worth anybody's while to discuss."

Taking the above results and views as the epitome of the American experimentation with the steel tie, a comparison with the European efforts in the same field becomes a matter of considerable interest for the student of railroad affairs as well as for the practical man who wishes to be kept informed of all progress in railroad development, and I have been asked by the *Railroad Gazette* to epitomize the experience with metal track on the Continental railroads. This task I, of course, could not assume were not the material laid ready to my hand, and it is rendered somewhat less difficult of accomplishment because the data had been collected for this very purpose by Mr. J. W. Post, Chief Engineer of the Netherlands State Railroads, Mr. Ch. Renson, Engineer of Maintenance of Way, of the same company, by whom steel tie experiments have been conducted through many years, and Mr. Auguste Moreau, a member of the Steel Tie Committee of the French Society of Civil Engineers. It is much to be regretted that Mr. Post's undue modesty concerning his knowledge of our language prevents him from undertaking the duty, but the present writer is at least a disinterested observer who, ever since he first examined into the infancy of the metal tie question on a European trip in 1884, has not been over-sanguine that it would survive.

At the outset a difficulty is encountered in the great mass of detail to be concentrated. We will begin with Mr. Post's statistics of metal tie mileage in Europe, at the present time. To save type and time the original metric figures are omitted and the equivalents stated in miles.

All the railroads belonging to the "Union," German, Austrian, Hungarian, Dutch, Roumanian, etc., now have about 68,000 miles of track, about 10,500 miles of which, or 15 per cent., are on metal ties. All German railroads (situated altogether in German territory) have about 40,000 miles of main track, about 10,000 miles of which, or 10 per cent., are on metal ties.

The Prussian-Hessian State Railroad now has about 26,100 miles of main track (on 19,500 miles of road), about 6,200 miles of which, or 24 per cent., are on metal ties. In 1901 this railroad will renew about 1,200 miles of track, of which about 37 per cent. will be on metal ties, for which were ordered 85,452 tons (1 ton = 1,000 kilogrammes) including metal ties for switches, at a price of 111 marks, or $26.70, per ton. The weight of ties ordered this year is about half the weight of rails ordered.

The French State Railroad has now about 1,864 miles of road and has used metal ties since 1887 only. Actually about 600,000 metal ties are in the track. Notwithstanding very high steel prices in 1898, 1899 and 1900 steel ties were put down.

Mr. Post states that he visited a section of steel tie track about 4½ miles long near Chartres on this road last summer (1900) and found it very satisfactory; both the higher and lower officials being well pleased with the results of the experimental section. Ties weighed each 57 kilos (125 lbs.), speed of trains 56 miles per hour, heaviest axle loads 13½ tons. These ties had been in the track for nearly 14 years and about 125,000 trains had passed over them. He also visited, last summer, an experimental track laid in 1886 on the Eastern Railroad of France, with Vignoles steel rails, steel ties weighing 170 lbs. each, felt shoes between tie and rail; greatest axle loads 16½ tons and speed of trains 56 miles per hour. These ties had been in the track 14 years and about 365,000 trains had passed over them. Mr. Post adds "I doubt if there are in the United States of America to-day many ties over which 365,000 trains with heavy axle loads and high speeds have passed. We took out some ties and examined them; they looked so well that there seems to be no reason why they should not stand a total of 500,000 or 600,000 trains. As the influence of rust is insignificant a traffic of 500,000 trains corresponds to

137 years for 10 trains daily,
91 years for 15 trains daily
68 years for 20 trains daily,
‡27 years for 50 trains daily.

"It is noteworthy that these ties, manufactured in 1886, are without the latest improvements." [Further on in this article the characteristics of the various types and sections of the ties referred to will be given.]

In 1865 about 10,000 "Cosijns" iron ties (Fig. 1) in the form of I-beams with oak cushions under Vignole rails were put down, weighing, without the blocks, 125 lbs., speed of trains 46 miles per hour, axle load 14 tons. Mr. Post visited this track also last summer; the ties had then been down 35 years in gravel and sand ballast, and about 210,000 trains had passed over them. The weight had decreased about ¼ lb. per tie per year.

Mr. Post finished his examination by visiting the Saint Gothard Railroad in Switzerland and states that of 570,000 ties now in the main track, about 400,000, or 70 per cent., are metal ties. The traffic is heavy; engines up to 100 tons; sharp curves, down to 280 meters (about 6 deg.) track was splendid; gage, surface, curves, etc., all right, rail-joints strong. In the long tunnels, however, the influence of rust was great. All tie renewals on this road are steel, except in portions of tunnels. Several other Swiss railroads use steel ties.

Before turning, as we shall presently, to the structural and economical features of the steel tie in Europe, we may give heed to Mr. Post's views concerning their advance in favor with railroad men. And it is just and fair to state at the outset that no question of patents is involved, as the patent covering the rolling of ties with a variable section, an important feature, has expired and the other improvements introduced by Mr. Post were not patented. He states further that he is not financially interested in any patent, shape, or manufacture of steel ties, fastenings or such like, which seems to cover the subject and entitles his views to a candid consideration.

Mr. Post gives it as his impression that in Europe and the Colonies the use of steel ties is constantly increasing because experience has shown that if a suitable type of tie and fastenings is chosen, well manufactured and put down under proper circumstances (not on marshy ground, nor in a badly drained roadbed, nor in muddy nor impervious ballast) it will make a great saving in renewal and maintenance labor. He says that he does not think the Prussian-Hessian State Railroad puts down such enormous quantities of steel ties yearly "merely to please steel manufactures" (as Colonel Prout seems to have wickedly suggested) for the Agrarians and forest owners in Germany are very influential and would not allow of it if it could be proved that steel ties are not economical for the track. No more, he continues, does the French State Railroad do it for the steel industry. Switzerland, he adds, produces no steel at all and yet the Swiss have gone on putting down steel ties ever since 1886. He thinks that the proper consideration of the steel tie may contribute:

(1) To reduce operating expenses on American railroads.

(2) To reduce the devastation of American forests.

(3) To give employment to American steel industries when prices are low.

Mr. Moreau's contribution is a carefully prepared and valuable monograph§ on metal ties, read before the French Society of Civil Engineers which I have translated, and from which I shall make extracts without quotation marks.

When we reflect that there are over 1,000 million of cross ties in use, at an annual expense of say $80,000,000 or more, even a very insignificant saving per tie becomes an important consideration; a reduction of only 1/5 of a cent per tie and per year would aggregate a saving of $2,000,000. Successive International Railroad Congresses have recognized the vast importance of this item and made it the object of their keen solicitude. Since the epoch when were employed only untreated wooden ties, great progress has been made, notwithstanding increased weight and speed of trains, in prolonging the life of the track, due to the rational selection of materials for ballast and preservative injections, to the employment of metal tie plates and felt shoes or cushions, to the use of rail chairs and better fastenings and, finally, during the last 20 years, to the employment of iron and of steel for the ties themselves.

Out of the very great number of systems of all-metal track many have not given the desired result, and on the other hand many of the experiments were followed without method and embraced too many elements at one time; consequently there is great difficulty in arriving at a conclusion based on the real facts. The most comprehensive of all the experiments were made by the Netherlands State Railroad, where, for a basis of comparison, a new section of standard wooden tie track was installed in 1881 and from 1881 to 1890 20 experimental sections of metal track were put into service, applying each year the latest known improvements. Under Mr. Post, Mr. Renson continued these comparative experiments, with great

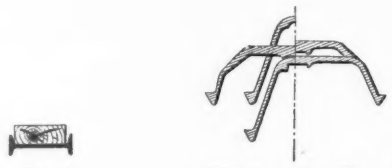


Fig. 1.

Fig. 3.—Post Ties.

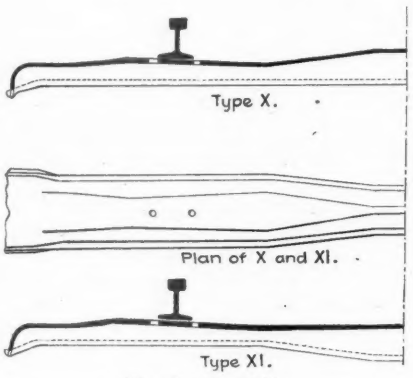


Fig. 2.—Post Ties.

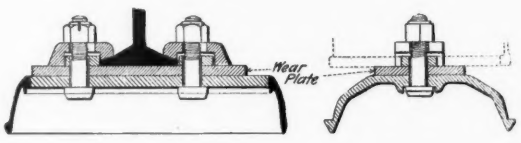


Fig. 4.—D Fastenings.

Fig. 5.

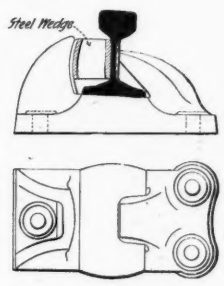


Fig. 6.—C. I. Chair.

*N. Y. C. & H. R. R. R.

†Pennsylvania Railroad.

‡Contrast this with second case on N. Y. C. & H. R. R. R. given above.

§*Les Traverses Métallique par Auguste Moreau. Extrait des Memoires de la Socicte des Ingénieurs Civils de France.*

perseverance from 1881 to 1899, that is to say for 17 years, and made them the objects of special observations, noting minutely the number of days labor of the track force, the number and dates of ties and accessories returned for defects and examining periodically certain specimen ties and fastenings of each system. The experiments were made under normal conditions, that is to say, those of perhaps nine-tenths of the railroads of Europe, with sand or gravel ballast, 13 ties to 12 meters of rail, steel rails of 38 kg. per meter (76.6 lbs. per yard) of the old Belgian State Section, 68-ton locomotives with heaviest axle load of 13.9 tons, maximum speed of 47 miles per hour, minimum curvature 5 deg.

For conciseness only the most successful types are here illustrated. Fig. 2 shows the common plan with variation in profile of types X and XI of Post ties with drilled holes. Type X is known as the "Dromedary" and type XI as the "Fish-belly." Both these have what is known as the "variable profile," which term applies to the varying thickness of the metal, which is clearly shown in the cuts. They are first rolled in the flat with varying thickness and afterwards die-forged into form. They may also, of course, be made with a constant profile. The patent for the process of rolling the variable profile has expired. Fig. 3 shows the variable profiles at several points. Fig. 4 shows the assemblage of tie, rail and the "D" fastenings. It is to be noted that the bolt-stock is round and turning is prevented by its square head being lodged between two longitudinal rolled fillets on the lower surface of the tie table.

Fig. 6 shows the cast-iron chairs used in connection with the steel ties, and Fig. 1 shows the "Cosijn" ties with the original wooden blocks.

The best comparative results were given by the Post type X (Fig. 2) with the "D" fastenings (Fig. 4), which is stated to be far preferable to the oak tie from all points of view; in the longer life and lower annual cost of renewals of ties and fastenings, better conservation of rail flanges, reduced expense of tamping, lining, surfacing and preserving gage, and greater security. Those specially interested in the question of metal track may find in Mr. Renson's report very full details of the various systems tried with the defects observed and their causes. I shall confine myself to some fundamental ruling points, viz.:

Influence of rust; maintenance of track; wear; development of the use of metal for ties; cracks.

Influence of Rust.—Mr. Renson cites the example before referred to of 10,000 metal ties of the Cosijns system, iron I-beams laid on the flat, with oak bearing blocks (Fig. 1) put into service on the Deventer-Olst line of the Netherlands Company, in 1863, and which were in such excellent condition after 34 years of service, and the management were so well convinced that they would last many years longer that it is actually replacing the oak blocks, which only last from 3 to 10 years, with metal blocks.

Wear.—In order to reduce the friction and hammering of the surfaces of contact between rails, ties and fastenings it is very essential to prevent loosening of the nuts. Mr. Renson claims that there exists one system at least which is absolutely non-loosening under vibrations due to the passage of trains, and that with it the wear on the rail flange, top of tie, edges of bolt holes, bolts and clamps is reduced to the minimum. The experience on the Gothard Bahn before referred to bears out this statement; for that company using steel ties of the Post type considers after 19 years' experience "that the life of steel ties may be taken as equal to that of steel rails.||

For main lines Mr. Renson considers there may be advantage, especially on curves, in intercalating a steel wearing plate under the foot of the rail. With "D" fastenings they can be introduced and renewed without removing the bolts.

On the Eastern Railroad of France it was evident that a felt shoe intercalated between rail and tie contributed very considerably to the lightness of the wear, by eliminating the working of the rail on the tie, preventing sand and dust from getting in between them and by giving a good elastic assemblage on the fastenings, and Mr. Renson proposes now for all lines of heavy traffic to adopt wearing plates of good tarred felt, for while it is true that these felt "soles" cannot serve for more than 75,000 to 100,000 trains, with the "D" fastenings their replacement is easy and expeditious since the bolts do not have to be removed in the process. However, it will be desirable to search for some other material for the sole, something elastic and tough which will resist both air and moisture better than the felt without being too costly. The finding of the ideal sole will be a new step in the development of the metal tie question because apart from the still greater elasticity of assemblage and the lesser wear there will also be a diminution of the dynamic action of the wheel on the tie with a corresponding reduction of noise and of the metallic rattle of the trains.

Cracks in the Metal Ties.—In all the experimental sections where ties with rectangular punched holes are used, small cracks starting from the corners of the holes are produced after a few years' service, whereas with the round drilled holes of types X and XI not one of them showed a sign of a crack. From the standpoint of security, however, the cracks present nothing terrifying. During the last few years the use of mild steel for ties, especially that made by the basic process, has greatly improved them in this respect. The large cast-iron shoes which are used more especially for bull-head rails, but also for rails with a flat foot (Fig. 6) absorb still better than the felt the shocks from passing trains (due to flat wheels, worn rail-joints, etc.), and although their employment upon punched steel ties will not guarantee them absolutely against cracks, still ties so protected may yield good service.

After all, the radical means of evading the cracks is to proscribe punching entirely and to require the holes to be drilled. The "D" fastenings have longitudinal fillets rolled on the under side of the tie-table to receive the square bolt heads and keep them from turning. The opposition to drilling first shown by the steel works has been overcome, and to-day all the four holes required can be drilled at one time precisely, rapidly and cheaply. As an acceptance test it is well to require that the entire tie, with holes drilled, shall stand without cracking, bending cold through the holes and then flattened under a steam hammer should stand bending 180 deg. with a radius almost zero, also through the holes.

Maintenance of Steel Tie Track.—The expenses of maintenance were found to be greater with types I to V than for wood ties, yet this difference was overcome by a saving in cost of renewals; each of the types that followed was an improvement in this respect over the preceding one. For the Post ties of types X and XI (Fig. 2) with D-pattern fastenings (Fig. 4) the expenses were much lower. Some railroads complain of the difficulty of properly lining a metal track; this is principally due to defective gaging; for, if the holes for the fastenings are not placed exactly as they should be, in aligning the rails on the gage side those on the opposite side will present sinuosities unless the disposition of the fastenings permits of correcting the differences. The eccentric square washer (Fig. 5) of the "D" fastenings remedies these irregularities very easily and allows of obtaining and maintaining a high degree of gage precision. Some engineers do not like to have the bolts introduced from below; on the other hand to introduce them from above requires large holes which weaken the tie in the place of greatest strain. The bolts of the "D" fastenings are for the latter reason applied from below, but since they can remain in place during all the operations of track work that causes no inconvenience whatever, as has been proved by their eight years of trial on the Netherland's Lines; it very rarely happens that a bolt breaks if made of good material; excellent results have been obtained with Martin steel having the following minimum: 44 kg. per sq. mm. (62,500 lbs. per sq. in.) resistance to tension, 48 per cent. reduction and 23 per cent. elongation in 200 mm. (8 in.).

The London International Railroad Congress, of 1895, representing about 350,000 miles of track, confirmed the conclusions reached by the preceding congresses of Brussels 1885, Milan 1887, Paris 1889, and St. Petersburg 1892, by stating that in rational conditions the use of metal ties may afford economy in maintenance of way. And a conclusion almost identical, but more general, was reached by the Convention of Engineer Delegates to the German Union of Railroads, including German, Austrian, Roumanian, Polish, Dutch and Luxembourg Lines, 65,000 miles of track.

"When the substructure is good and the ballast is of good material, the steel-tie track satisfies all requirements provided that ties of sufficient length are used, weighing for the normal track 58 to 75 kg. (128 to 150 lbs.) with properly designed fastenings."

The superiority of the method of maintenance of way by general revision, as against piece meal renewals, is recognized, but in the case of wood ties it results in the premature replacement of a portion of the ties before they have really attained their limit of usefulness; this capital objection disappears with a good system of steel ties.

Development of the Use of Steel Ties.—On the State Railroads of France, beginning with the experiments of 1887, the use of steel ties has gone on progressively by reason of the good results obtained until there were 350,000 in 1898, and subsequently orders have been placed for 200,000 more.

On the Saint Gothard Railroad the use of wood ties is limited to the tangents of the long tunnels, upwards of 70 per cent. of all the ties being of steel of the Post type. The other Swiss railroads have followed the example of the Saint Gothard, and the development of metal track in that country is all the more significant and convincing of its superiority because Switzerland, having no steel works there, has no individual interest to push the use of steel.

On the Prussian State Railroads the totals of steel ties are constantly growing: in 1893, there were 44,000, and in 1898, 76,000. In 1893 the number of tons of ties consumed was only 34 per cent. of the number of tons of steel rails consumed for that year, while in 1898 it was 48 per cent.; it is, therefore, close to one-third of the entire railroad steel output, and this constitutes a very important item for the metallurgical and steel-rolling industries.

In 1899, 2,950 tons of steel cross ties, about 98,000 pieces, were ordered for the Soudan Railroad.

In the entire world there are now about 1½ million Post ties in service, notably in Holland, Belgium, Germany, France, the Transvaal, Argentine, Sumatra and India.

By his methodical and persevering studies, as well as by the publication of his report, Mr. Renson has rendered an important service not only to railroad companies who are actually interested in the question of metal ties, but also to administrations who, by force of circumstances, must sooner or later become interested.

For all countries having metallurgical and manufacturing industries the question of metal track is interesting from another point of view also. In the fabrication of each ton of steel ties there is about 2½ days labor, without counting the work of the furnace, the mine, the fuel producer, the transportation of material, the manufacture of fastenings, etc. Each ton of steel ties requires the transport of ten tons of merchandise, ore, flux, coke, coal and ties, to which is to be added the transport due to the fastenings.

||*Revue Technique*, 1898, page 150.

The National Railroad Master Blacksmiths' Association.

The annual convention of this Association was held in Denver, Colo., last week, with something like 150 members in attendance. The Association was welcomed to Denver by the Governor of the State, the Mayor of the city, the President of the Chamber of Commerce, and especially by President Jeffery, of the Denver & Rio Grande. Mr. Jeffery made one of his characteristic speeches, full of tact and appreciative of his audience. He told of some of the fine backsmiths whom he had known, including Robert Collyer, Andrew Baird, the master blacksmith of the Chicago shops of the Illinois Central, and others. His address was well calculated to give his listeners the notion of the dignity of their calling.

The President of the Association, Mr. Thomas Lace, of the Baltimore & Ohio, replied in an appropriate speech. He made the excellent suggestion that samples of the work done by the generation of blacksmiths now passed or passing away should be preserved in some of the museums. Those men had to make heavy and difficult forgings which would puzzle a good many of the present generation, as, for instance, locomotive driving wheel centers, locomotive crank axles, five-ton anchors and mooring swivels and chains. Some of these, he thought, should be preserved for future smiths to look at. The smith of the present day may not have to do by hand as difficult forgings as his father had, but he must know a good many more things. He must study the flow of hot metal in dies; the adaptability of various steels for cutting tools; the behavior of iron in bending, and must have a knowledge of refractory materials, fluxes, furnaces and the action of heat in general.

The Secretary's report showed 201 active members and 24 associate members. It showed also a substantial cash balance in the treasury.

Chicago was chosen as the next meeting place and the following officers were elected:

President, W. P. Savage, International & Great Northern; First Vice-President, John McNally, Chicago & North Western; Second Vice-President, George Lindsey, Evansville & Terre Haute; Chairman Executive Committee, R. A. Mould, Omaha; Secretary and Treasurer, A. L. Woodworth (re-elected), C., H. & D., Lima, Ohio; Chemist, G. H. Williams, Boston.

Mr. Woodworth presented a short report on the apprentice system, which follows:

THE APPRENTICE SYSTEM.

The apprentice system is the most important and far-reaching subject to come before this convention.

Great care should be taken in the selection of the boy; his habits, intelligence and ambitions should be carefully studied before installing him in the shop.

The age at which boys usually enter the shop for the purpose of learning a trade makes it important that the foreman should be very careful of his conduct toward them, as the influence thrown around the boy at this age has more to do with moulding his future than at any other period in life. The boy should be taught to make the best possible use of his leisure time, to attend night school and especially apply himself in obtaining a thorough knowledge of mechanical drawing. One of the first lessons to be impressed upon the boy's mind is that every man is the arbitrator of his own fortune; hence his progress will be entirely what he makes it. Teach him to be economical with his time, as well as the material that he handles. Usually the boy is put to running the steam hammer or heating bolts at machine until he has attained sufficient age to be put to helping or running a single hand fire.

On our system the apprentice receives 7 cents an hour for the first six months, at the end of which time he is advanced 1 cent an hour, and so on each six months, provided he is worthy of the advance. It will be observed that this is a much more liberal system than some of us were trained under. However, it is quite satisfactory to the financial interests of the company and in keeping with the spirit of progress and economy.

SAVING COAL.

Robert Henderson (C. & N. W.)—During the month of November, 1900, we built a fire pot on one of the forges with fire brick; we use a bottom blast. The blast box is 5 in. square by 9 in. long. The blast is admitted into the box on the side, close up under the bottom of the forge about 2½ in., with grate on top. The distance from top of forge to top of box is about 9 in. or 10 in., as required. I placed a course of brick around the top of the box, then took two more tier of brick, beveled the edges back so that the fire pot is 6 in. x 6 in. at the bottom, 8 in. x 8 in. at the top, which brought the top of the fire pot within 2½ in. of the top of the forge; then we built another course of common brick behind the fire brick and filled in behind with clay and ashes, and sloped it up from the top of the brick to the top

of the forge. I used a block for building the fires 5 in. x 5 in. at bottom, 6 in. x 6 in. at top, 18 in. long, placing the block in center of fire pot and packing the space with coal until it is even with the top of the brick; then build the bank the usual way. The brick prevents the fire from spreading out under the banks and burning coal where it is not wanted. By having the lining of coal around the inside of the brick, the brick does not injure or diminish the heating purposes whatever. The result was more than satisfactory to me on the saving of coal. By weighing the coal every day for one month, there was a saving of 40 lbs. of coal every day for one month, or nearly one-third of which we use on a forge. After such result with this one we changed the other fires with equally good results, and continuing so to do we have no surplus coke. There is another improvement I make in the saving of time and fuel. That is a drop grate in the top of the box. I make a grate that hangs on one side of the box with an arm that comes through to the front of the forge, and put a slide in the bottom of the box. In cleaning out the fires all you have to do is to draw back the slide and drop the grate, take the poker and push the clinkers and ashes down through. By this little change there is a saving of ten minutes a day for each forge; also by weighing the ashes I found that each time the fire is cleaned out there is from 5 to 6 lbs. less to go on the ash pile, which amounts to considerable in the course of a month.

John Coleman (C. & N. W.)—In looking over the report I see Mr. Savage and others have pointed out the waste of coal by the helpers shoveling out the coke and coal with the cinders when cleaning the fire. About four years ago I put a slide bottom in my forges and an ash pit under the forge. The helper removes all the loose coke from the fire, then pulls out the slide and pushes down the cinders and ashes with the poker; then pushes the slide back to place, and fills the box on top of slide with dry ashes to keep the air from getting through the bottom at slide. The cinder pile is in the pit, not on the floor; the air in the shop is not filled with floating ashes from the use of the shovel; the fire can be cleaned in one-fourth of the time it used to take, and we save one-fourth of the coal.

CRANK PINS AND PISTON RODS.

Wm. Young (Wabash.)—In making up crank pins we have a separate bin for keeping our refined scrap iron such as old main and side rods, rod straps, engine and crown bar bolts, etc. We put up our piles from 175 to 200 lbs., weld and draw into slabs, then cut and pile the second time. We put up piles of slab weighing from 1,100 to 1,200 lbs. each, take a welding heat, and weld piles with plain dies. In this way any impurities that may get in between the slabs are forced out. Rough down one-half of pile, take a welding heat on the other half, and rough down in same manner, then place back in furnace, put in rough swedges, take a welding heat, and swedge down to about three-quarters of an inch larger than forge size of collar. Heat and draw the other half the same way, take out the round swedges, put in crank pin dies, take a light welding heat on end of bar, swedge down until dies meet, cut off to length of wheel seat, and then it is ready for the lathe. Our dies are bored out ¼ of an inch larger than the finished size of the body of the pin, and forging them in dies of this kind keeps the forging straight by hammering down until the dies meet. It is not necessary to use callipers to know when they are down to proper size. We have been using nickel steel crank pins for several years, and they have given excellent satisfaction. They come to us forged and rough turned.

We make piston rods out of the best hammered charcoal iron, which is ordered considerably larger than the forged size of the rod. We take a good welding heat, and draw down to proper size. We have been using quite a number of steel piston rods lately, and they are giving good service. They also come to us ready forged and rough turned.

FLUE WELDING.

J. H. Hughes (St. L. & S. W.)—The different processes may be separated under the several heads, viz.: Cleaning, cutting, swaging, testing, the final cutting to proper lengths and the annealing. It is absolutely necessary that a flue-welding plant be condensed as much as possible, if the cost is to be reduced to a minimum. For instance, if the flues are cleaned by a rattler, a runaway should be made to the cutting-off machine, which should be in close proximity to the welder. If a roller cleaner is used the same should be in such a position that when flues pass through the cleaner they could be immediately stored convenient to the cutting-off machine, so that they can be quickly placed at the command of the welder without unnecessary handling. The flue could also be swaged with the same heat as when welded, and set back opposite the cutting-off machine, to be cut to the proper length and then placed convenient to the testing machine. The number of flues welded in a given time depends on the facilities at hand, as regards machinery and the relative position of each machine to the other. With a proper heating furnace the fuel could be either coke, gas or oil, in order that a number of flues may be undergoing the process of heating at one time. Several patterns of welding machines are now in use. I prefer and would recommend the rolling machine, since it is practically noiseless, and has an attachment for scarfing. At the same time, however, the safe end of the flue may be scarfed by the cutting-off machine, where the trip hammer for welding is used.

PNEUMATIC BULLDOZER.

A. W. McCaslin (Pittsburgh & Lake Erie).—About three years ago I designed and built a pneumatic bulldozer with two 16-in. cylinders placed tandem, which proved so successful in increasing the output and decreasing the cost of our medium and light car work, etc., that the Superintendent of Motive Power requested that a larger machine of the same design be built, which has two 30-in. cylinders, with 100 lbs. air pressure in reservoir producing an effective pressure of 70 tons. This machine is so arranged that the pressure can be used from one cylinder independently of the other or both together, to economize in the consumption of air when in use on light work.

Following are the names of some of the work done on it: Bends, arch bars, iron 4½ in. x 1½ in.; engine truck frame transoms, 8 in. x 1 in., two bends to 90 degrees at one movement; engine truck equalizers, 4½ in. x 1 in., edgewise; main and side rod straps; coach 6-wheel truck equalizers; drawhead or coupler pockets; drawhead carriers; guard rails; straighten car axles; upset lugs on end of drawhead pockets, head king pins, engine drawbar pins and bolts up to 2½ in. in diameter. [Photographs were shown of a variety of tools used with this machine.]

This machine will upset 5-in. square iron if properly heated. I prefer it to the ordinary bulldozer, for the reason that it is speedier, and the stroke can be regulated or controlled at will. Yet with any power in bulldozer form, if the foreman is not capable of designing proper tools to form or shape the work, his bulldozer is a dead power.

THE BEST FRAMES MADE IN THIS COUNTRY.

R. Laizure (Richmond Loco. Works).—We select No. 1 long scrap; this we have thoroughly cleaned and piled in piles weighing 300 lbs. each. We work these piles into slabs about 44 in. long, 12 in. wide and 2 in. thick. We work these only once. We then take eight of these slabs and put them together, and make half a frame back. And we consider when this is properly worked that it will make a much better frame than was formerly made by taking twelve slabs, which were double worked, or worked twice, and making the frame back in one piece or without a weld. We consider the last-mentioned way impracticable for many reasons. First, it was too much iron to be properly handled and worked down to the size for frame backs. Second, the iron being double worked became crystallized and brittle by using twelve slabs. Third, while all locomotive builders would say a frame made in this way was made in one piece, it really had from two to three welds, or what a hammersmith would term a lay-on, which, in our opinion, are inferior to the same number of welds. For example, you may weld up a lay-on, and not be able to see where it is welded, and at the same time it will be weaker than an ordinary weld. When we make our frame backs out of single worked slabs eight in a pile, the iron is not worked too much, nor is it worked too cold. We then make our weld in the center of the back. Our iron is selected, and piled in the same way for our frame legs, the only difference being it is double worked into short billets suitable for staff work. Our legs are bent, having a long toe for the brace weld, in order to prevent the hole for the bolt, which holds the pedestal cap from coming in the weld of the brace. This leg we make in one heat suitable to be welded on the frame. Some of them weigh from 200 to 255 lbs. We make an average of 35 of these a day.

There are a great many ways to make iron driving axles. Our way differing in some respects from the many reports we have read on this subject, we think it might be of some service to state the best way that we know. After having made them in every conceivable way, we have adopted the way which we here mention. We first select our scrap as we do for all other work; we then have the furnace in good condition. The next thing is good coal. We use single worked slabs instead of double worked. Our iron is carefully cleaned off before it is put into the furnace, and while heating the piles or fagots we never allow the fire to be poked up with the blast on hard enough to blow coal in the furnace, and we find this causes bad work.

While poking the fire up with the blast on full, and an inferior quality of coal, we find it drives the fine coal in between the slabs, which causes it not to weld and makes a bad axle. Another thing to guard against is to not get the iron too hot on one side before turning, as we find it seldom happens that an axle is bad only on the first end roughed down, and the first side next to the bridge; that is, the side of the pile which is next to the bridge when it is first put in the furnace. Since we have adopted this method we very seldom lose more than three or four axles out of a hundred.

Drop-Bottom Coal Cars—Pittsburgh Coal Co.

Last week we described the 80,000-lbs. capacity drop-bottom coal cars of the Pittsburgh Coal Co., in which there is a special feature at the brake-staff end of the car, giving 6 in. additional width in the car body beyond the first stake pocket. It is interesting to note further that the light weight of these cars is 34,000 lbs. and that a number of them have been loaded with from 90,000 to 94,000 lbs. of soft coal. From this it is evident that they are fully able to carry their nominal capacity of 80,000 lbs., the 6 in. in width gained by the Z-bar feature being quite an advantage.

Rail Joints.

The sectional discussion of the report on rail joints presented at the Paris meeting of the International Railway Congress is now made public in the July issue of the *Bulletin* of the Congress. The extracts which we print below give the essentials of the discussion.

Mr. Ast (Kaiser Ferdinands-Nordbahn, Reporter).—As my report has only been published very recently I feel bound to sum up at greater length than is customary.

I find myself in a curious position. The supported joint appears to have been discarded altogether, and is barely mentioned in the numerous replies sent in response to my detailed questions. From these replies it appears moreover that, in most cases, the existing suspended joint is considered to be too weak for the great wheel loads prevailing. It would appear therefore that the useful application of this joint is limited. Finally, the recent trials which had been made in the direction of a continuous rail by means of the welded joint and of the cast-welded joint have not been carried out on a sufficiently large scale at present. Under the circumstances the reporter had only left to him the thankless task of laying before you all the improvements which have been made in succession in the suspended joint, and this could not result in any real progress. This appeared to me insufficient, and with a view to explaining the action of the various arrangements, I thought it necessary to carry out comparative trials of the two extreme types of construction; the supported and the suspended joint. In my report I have given a description of these trials in which I adopted photographic recording methods. This enabled me to measure the play of the rail ends under the rolling loads. . . .

The blow which the wheel gives to the receiving rail end explains of itself all the deleterious action which the joints produce on the track, on the rolling stock and on the tractive effort required. In the supported joint, where the rail ends are carried on sleepers, the movement of the joint and the resulting jolt are reduced within narrow limits. This play is still further reduced by the supporting action of the fishplates. In the case of the suspended joint, on the other hand, this depression has a greater range, owing to the elastic yielding of the rails, which has mainly to be met by the resistance of the fishplates. The resistance of the suspended joint is therefore chiefly dependent on the efficiency of the fishing. This efficiency is very low. For what reason?

The vertical forces acting are concentrated on the bearing of the fishplates at a few points where they exert heavy pressures. These points are subjected to rapid and unequal wear, and the play of the rail-ends, small to begin with, becomes increased by giving rise to the jolts mentioned above. As these jolts give rise to dynamic forces in addition to the wheel load, and as these forces in turn react on the formation of the jolts, it follows that the cause and effect are materially increased. Moreover, the bending stresses to which the fishplates are subjected may exceed the permissible limits.

The result of the experimental comparison of the two types of joint has been to show clearly some advantages of the supported joint. The question which then had to be asked was whether this discarded method might be worthy of serious attention in view of the increasing demands of the traffic. The first experimental results required confirmation by trials made on a large scale. I thought myself fortunate in finding a suitable place on one of the lines of the Kaiser Ferdinands-Nordbahn which was subjected to heavy traffic. This track, which has been in existence 35 years with supported joints, has afforded an indisputable confirmation of the results mentioned above.

Having dealt with the general question of the mode of action of the more frequently used types of rail joint, I will now pass on to the report proper, in which the progress made in those joints in use is examined and discussed.

Such progress consists, in the case of most railroads, in the improvement of the suspended joint.

All attempts made with a view to improving the joints have had for ultimate object the reduction, as far as possible, of the pressure on the bearing of the fishplates and of the fatigue to which the fishplates are subjected. The increased rigidity and strength of the track have already tended to this. In respect to the arrangement of the joint, we find that the fishplates have been strengthened, that they have been lengthened even beyond the joint sleepers, that they have been provided with a bearing on the sleepers and that the rail ends have been fastened more securely. Moreover, the space between sleepers at the joint has been reduced, and finally an unsymmetrical arrangement of sleepers at the joint has been introduced so as to meet the greater stress to which the receiving rail end is subjected.

In this respect a further step should be taken: the joint should be made independent of the means adopted to prevent creeping, and thereby relieved of the extra fatigue produced by these horizontal forces.

In fact, no method and no arrangement can free the suspended joint from the fundamental disadvantages inherent to it, which prevent a harmonious arrangement of the details being arrived at, so that the work and wear may be equally distributed over the various constituent parts.

For this reason the assistance of the sole of the rail has been called into play, as well as that of the bearing surfaces under the head, for resisting the vertical forces. This idea is carried out most simply in that arrangement in which the side fishplates are bent under so as to support the rail ends. It exists also in more efficient shape, in that arrangement in which wedges pass through the descending portion of the fish plates (*Keillaschenstoss*).

Moreover, as the fish plates are lengthened beyond the joint sleepers in the two preceding cases, a sort of bridge-joint is formed. These latter arrangements form a sort of compromise between the method which consists in carrying the rail ends on a bearing and that in which they are carried freely by the fishplates. The latter are partly relieved of their function as carriers by reason of the bearing under the rail head. The first principle of all these methods of construction is to offer resistance to the formation of jolts. When the fishplates are lengthened so as to project beyond the joint sleepers, a further principle is introduced which consists in the connecting and stiffening of these two sleepers so as to divide the vertical forces between them. It is in the bridge-joints that these two principles appear to be combined most effectively. Though the series of ingenious inventions of such arrangements is very long, none has fulfilled expectations. Nevertheless, I feel convinced that the above-mentioned constructional principles should not be departed from, at any rate so far as freeing the fishplates from their bearing under the rail heads is concerned.

I arrive at this conclusion for both theoretical and practical reasons.

The characteristic features which have just been found in the joint with wedges, in the bridge joint and in similar arrangements, show these to hold an intermediate position between the suspended joint and the supported joint. But this double position is only obtained by means of a complicated structure, which easily gives rise to other troubles.

Moreover, in following up the methods which tend to relieve the side fishplates of their carrying function and to diminish the jolt, the supported joint appears to be the simplest arrangement of this class. In this respect the results of certain known trials, made with a similar end in view, will serve as a guide. These comprise the American three-sleeper joint, the joint proposed by Mr. Collard with two sleepers placed side by side, and finally the binding together of two saddle plates which carry the two rail ends on a single joint sleeper—an arrangement adopted by an Italian railroad. Again, on the Paris Metropolitan, where the skill of the French engineer has succeeded in the realization of an admirable piece of work, the whole of the track is laid with supported joints. It would be of great interest if the reasons which led to the adoption of this arrangement could be given in the discussion.

In the supported joint, as the tendency to cause the jolt is reduced by the joint sleeper, the wear of the fishplates is much less.

Thus, it will be seen, both from theoretical investigation and from practical experience that the supported joint possesses material advantages over the other. Latterly, however, it has been almost entirely forgotten. The objections raised against it in the past were unstable bearing on the joint sleeper, as well as noisy and deleterious hammering action under traffic. These objections were in great measure justifiable. It appears to me, however, that these unfortunate objections were in a less measure due to the arrangement than to the inadequate strength of the construction of the permanent way and of the materials employed in it.

I have already referred to experiments made on a line subjected to heavy traffic, on which the supported joint was fitted, which show that the objections raised against this form of construction are by no means unavoidable. One of the rail-joints taken from this express track is on view at the Austrian Railroads Historical Exhibit in the Champs de Mars, and I desire to draw your careful attention to this specimen. No track fitted with suspended joints, however designed, could have stood the demands made on it so well. It is probable that many other managements may have made similar trials.

The experiments quoted and the above-mentioned results suggest the advisability of undertaking further trials of the supported joint on a much bigger scale, under the best and most perfect conditions, both in regard to the quality and the design of the component parts of the joint.

The most radical measure which could be adopted to meet the trouble which arises at the joints would obviously be the abolition of the joint.

Welded joints have given very satisfactory results on tramways. On ordinary railways, however, this question has not been properly investigated. Some of the French railroad managements have announced their intention of making experiments of which the ultimate results are being awaited with the greatest interest.

Starting from the facts mentioned in my report and taking into consideration: (1) that the fishing hitherto in use on suspended joints permits excessive fatigue of the component parts and does not tend to harmonious working; and as (2) the several variations from the normal construction of these joints, though based on the same principles, have failed to give thorough satisfaction in the forms which have been tried as yet; moreover as (3) the increase in rigidity and strength of the permanent way itself, the improvements made in the fishing and in the arrangement of the sleepers have only resulted in a reduction of the joint trouble instead of its elimination; and finally as (4) trials and investigations had shown that the jolt was less at the supported than at the suspended joint:

I venture to submit the following conclusions to the meeting:

"The congress, in order to arrive at a satisfactory solution of the question of rail joints, thinks it advisable to recommend to the railroad managements:

"1. To make trials with suitably improved supported joints.

"2. To make trials with arrangements for preventing creeping, without using the fishjoints for this purpose.

"3. To make trials with a view to reducing the number of joints, more particularly by the welding method."

Mr. Toulon (French Western Railroad).—The French Western Railroad Company, for six months, has had in use a joint which has a bearing on three sleepers, as in the case of the American joint just mentioned. This new arrangement was adopted in the first place on the Invalides-Courcelles line and on the Invalides-Versailles line. The period of trial has not yet been sufficiently long to enable me to give any conclusions favorable to the system based on practical working.

Mr. Ast, in his report, has briefly mentioned this joint. Allow me to complete the description of it. The joint carried on three sleepers, which I designed and which has been adopted on sections of the French Western Railroad laid with double-headed rails, is secured by fishplates of different form and great length. One fishplate is turned back under the rail so as to form a sole or bearing plate; the other is similar to an ordinary, heavy, fishplate. The rail on which the joint is fitted is of the double-headed pattern weighing 46.25 kilograms per meter (93.23 lb. per yard). The total length of fishplate is 1.50 meter (4 ft. 11 in.), they weigh 144 kilograms (318 lbs.), the pair and are fastened by 10 bolts 25 millimeters (1 in.) in diam. The sole of the large fishplate is fastened to the three sleepers by screw-spikes and acts in place of the ordinary chairs used between joints; one of the sleepers is placed under the joint. The pair of fishplates holds the joint in a very rigid frame. The moment of inertia of the fishplates is 1.24 time that of the rail itself; the moment of resistance of the fishplates is greater than that of the rail.

In this type of joint, which differs materially from those forms in use in America, the rigidity is very great; the long and strong fishplates, and the joint being supported by a sleeper, prevent bending of the rail ends. Up to the present the running has been very satisfactory and the system appears to be likely to give complete satisfaction under the heavy traffic from the Invalides to Courcelles. It will be interesting to see whether these joints will give satisfactory results under trial of longer duration.

So far as the American three-sleeper joints are concerned we are without data respecting the results obtained.

I do not object to the recommendation that further trials of the supported joint should be made, but I would ask that this recommendation be so worded as not to imply any marked preference for this joint. We must not hurriedly accept a conclusion that seems to me to admit of doubt.

I now come to the third conclusion of the Reporter, relating to welded rail-joints. This question has been frequently referred to in the press and before meetings. Personally, I am dead against trials of welded joints over long sections of track.

I admit the possible advantage of joining two rails each 5.50 meters (18 ft. $^{9}/_{16}$ in.) long for example, so as to form one rail 11 meters (36 ft. 1 in.) long; I further admit that three rails each 8 meters long (26 ft. 3 in.) might be welded so as to form one rail 24 meters (78 ft. 9 in.) long, but I am not prepared to admit the possibility of dispensing with joints over a length of several kilometers. This can only be done on tramways.

Mr. Cartault (Paris-Lyons-Mediterranean Railroad).—Might we not strike out the word "satisfactory?"

The suspended joint has been subjected to rigorous examination, but perhaps it is not quite so bad as has been made out and, for my part, I am far from condemning it. The supported joint bearing on a sleeper possesses a natural inherent disadvantage; this is as follows: When the wheel of a locomotive is leaving a rail, the whole load comes on the side of the sleeper facing the direction of movement; when the wheel passes on to the receiving rail the load comes on to the other half of the sleeper, so that the sleeper being alternately loaded on one side and on the other is constantly subjected to a rocking movement and is wanting in stability. At first sight, therefore, it appeared difficult to give the supported joint the preference; but it is possible that by adopting suitable improvements a more satisfactory arrangement will be found. Moreover, there are no complete data to serve as a basis for formulating a definite opinion. I would ask the Congress to recommend both systems while expressing a hope that the supported joint may be perfected. I believe that we are generally satisfied with the suspended joint in France.

Mr. Loree (American Railway Association).—The lines in the Pennsylvania interests are using about 140,000 tons of rail annually for repairs, of which about 40,000 tons are used on the lines West of Pittsburgh comprising 2,872 miles of line open.

Leaving out of consideration the rail failing from excessive wear due to sharp curvature which is inconsiderable, our rail may be said to fail through the permanent deflection at the ends which eventually becomes so great as to make the track ride badly. Our practice is to take the rail out of the track of heavy traffic at the end of about ten (10) years, remove about 18 in. from either end at one of the four cold-sawing plants, redrill the rail and relay it on lines of light traffic where about ten (10) years additional life can be secured from it, so that practically our rail fails at about one-half its reasonable life by reason of weakness of the joint.

About two years ago we began a systematic restudy of the joint question. We secured from the Government copies of all patent papers issued from 1853 to 1898 inclusive. These were found to divide themselves as follows:

Types of Rail Joint Fastenings.

1. Splicing rail ends	467
2. Compound rails, two, three or four pieces, bolted or riveted	186
3. Lapping rail ends	72
4. Supporting base of rail by clamps or trusses	71
5. Mortising rail ends	35
6. Bridging the joint by wheel-carrying splice or rail	26
7. Electrical or cast welding forming continuous rail	4
Total	861

We selected six of the most promising of these patented joints and laid them in 10-mile stretches for trial on 60-ft., 85-lb. rail, American Society of Civil Engineers' Section. We also laid down joints of our standard angle-bar section, rolled from axle steel and from nickel steel carrying 3 per cent. nickel. Systematic observation is being made of the behavior of these joints, though sufficient time has not yet elapsed to draw any definite conclusions.

Baron Engerth (Austro-Hungarian State Railroad).—Gentlemen, it appears from Mr. Ast's report that each joint has its supporters and opponents, and that, too, in the same country. Personally, my preference is for the supported joint, which gives good results on our lines. The investigations made in the various countries do not appear to me to be sufficiently complete, as yet, to enable a definite conclusion to be arrived at. Nobody can deny that the suspended joint has certain disadvantages, but it is equally true that nobody can claim that the supported joint is incapable of being improved. As, on the other hand, several managements are of opinion that the supported joint is the better, it appears to me that Mr. Cartault's proposal, which does not tend to the exclusion of either system and encourages companies to find means for improving the joints, might be accepted.

The President.—The following are the

CONCLUSIONS.

"The Congress thinks it advisable that while, continuing experiments on the improvement of suspended joints, railroad managements should undertake or continue experiments with all other classes of fish-joints, particularly with the supported joint. It also thinks it advisable that experiments should be made with a view to reducing the number of the joints, particularly by welding the rails." These conclusions were adopted by the general meeting.

Electric Traction on Railroads.*

BY K. V. KÁNDO.

The author contends that the alternate-current solution of this problem is the best. The question is altogether different from the problem of providing power for tramways. The distances and the amount of power required are much greater; and the load factor is also very different. For instance, on three interurban tramways in the neighborhood of Buda-Pesth the ratio of the maximum to the mean load on the power stations ranges between 1.7 to 1, and 2.9 to 1. On the other hand, on a line 15 kilometers long, running from Buda-Pesth to Vacs, where there is a fairly heavy traffic, the above-mentioned ratio becomes 7 to 1. Batteries can be applied to contribute towards the equalization of the load on the generators; but alternate-current transformers can also bear considerable overloads of short duration, and cost far less.

The firm of Ganz & Co. went fully into the question when they undertook the reconstruction of certain Italian lines on the border of the Adriatic Sea, which work is now nearing completion. It was then decided to use alternate current, the high-tension current being applied direct to the motors without the intervention of any transformers. Before granting the concession to construct the line from Burgdorf to Thun, the Swiss Government consulted Kapp, Weber, and S. P. Thompson, all of whom reported that high tension was suitable and desirable on the proposed line. Before presenting his report, Weber carried out experiments with a view to ascertaining the voltage dangerous to life; and he reported that under certain circumstances 100 volts have been known to be fatal, while, on the other hand, under altered conditions, 3,000 volts do not necessarily constitute a fatal shock.

*From the *Zeitschrift Elektrotechnische*, Wien. Address before the Society of Engineers and Architects in Buda-Pesth. Abstract prepared for the Inst. C. E.

The author considers that under present conditions any advantages derived from increasing the voltage beyond 3,000 volts or 5,000 volts are outweighed by the increased difficulties of insulating the motors, and of constructing high-tension apparatus generally. The great objection to the alternate current lies in the distrust felt for high-tension current, in that it is possible for it to be dangerous to life. A shock can only result through failure of insulation, and then only supposing the current to leak away through bodies which are bad conductors in themselves, or are connected to earth through bodies having high resistance. This being the case, it is merely necessary to completely surround all conductors carrying high-tension current at all places by a continuous metallic sheath, and on the cars this metallic sheath must be directly connected in several places with the truck, and so with the wheels and rails. The carriage roofs must also be similarly connected to the wheels. The only piece of apparatus requiring manipulation is the motor switch, and this must be enclosed in a cast-iron case, and by interlocking arrangements it should be impossible to open the case unless the current has been previously switched off. At the various stations, the current should always be switched off the line, unless a train is either about to arrive or depart; and various precautions of a similar nature are mentioned. A slightly different solution of the problem lies in reducing the pressure by means of transformers carried on the trains; but this is not to be regarded as a satisfactory solution, seeing that it increases the weight of the train, and so does away with one of the chief advantages of electric traction which lies in the fact that the weight of the motors is small. Transformers might easily increase the weight of the train by 10 per cent. or 20 per cent.

Revision of M. C. B. Standard Journal Boxes.

Among the revisions of standards of the M. C. B. Association which are now being submitted to letter ballot, I think more detailed thought should be given to the recommended change in the journal boxes; namely, to omit the inner dust guard wall at the top of the 4¼ x 8, 5 x 9 and 5½ x 10-in. box. It is unnecessary to cut this wall away and I think it should not be done, as the efficiency of the ordinary wooden dust guard universally used is greatly decreased thereby.

The standard slot is ¾ in. wide and practically no dust guards are made more than ⅝ in. wide. The exclusion of dust and sand from the rear of journal boxes is therefore dependent upon the round about way in which this dirt has to get into the box from the back. If the inner wall is cut away entirely, above the center line of the journal, this opening for dust and sand is shortened almost 50 per cent., and as there is no waste packing to make a joint against the dust guard above the center line of the axle, I believe it will be found that a great deal more dirt will sift in on top of the packing in the rear of the box than with the inner wall in its present form. Fig. 1 shows the relative amount of opening for dirt to get in.

It is true that there is not enough clearance between

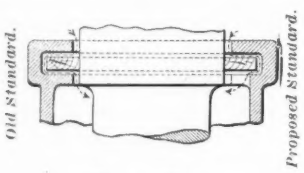


Fig. 1.—Plans.

the back of the brass and the inner wall of the box on the gray iron box, but this is not true of the malleable iron box, as the inner wall is only ¼ in. thick in the malleable box, which gives 3/16 in. clearance between the end of the brass and the inner wall. This clearance is abundant. On the gray iron box the ⅜-in. inner wall can be reduced very readily to ¼ in. just opposite the end of the brass, as shown in Fig. 2, thereby giving 3/16 in. clearance between the end of the brass and the surface of the inner wall.

The rear of our standard journal box is crude enough as it is, and it would seem a great pity to make any change in this standard that will increase the opening for sand and dust to get into the box with the usual

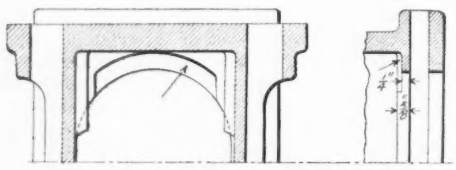


Fig. 2.—M. C. B. Box—3-16 in. Clearance.

type of dust guard, especially as this change is not necessary. I have seen a number of boxes made as shown in Fig. 2, and when the matter was brought before the Association I thought it was the intention to recommend this change.

I mention the matter now because I have just seen the drawings of the proposed standard, and think this point has been overlooked.

English Railroads in the Past Half-Year.

The results of working on the English railroads for the first half of the current year have turned out to be worse even than was anticipated. In the two previous half-years dividends had declined, despite a large augmentation in gross receipts; but in the period under notice there was a shrinkage in receipts, and with it a still larger growth in expenditure than has taken place before, with the result that the dividends are the lowest declared for many years.

Fifteen companies with which our review deals have a total ordinary capital of £289,825,816, on which the dividends for the half-year amount to £3,703,522, equal to a rate of 2 5/16 per cent. per annum. At the end of June, 1900, the ordinary capital amounted to £285,465,577, and the dividends paid thereon to £5,050,738, giving an average rate of 3 5/16 per cent. per annum. The loss of gross revenue was not universal, the Great Eastern having a fairly substantial increase, and the Great Western, Brighton, South Eastern and Chatham, and South Western companies securing a moderate improvement as compared with the first half of 1900. In these cases, however, the expansion was more than absorbed in increased expenditure, while those companies which failed to maintain gross receipts suffered the heavier loss of net revenue, since they found it impossible to cut down expenses in proportion.

The passenger traffic retained a fair degree of elasticity, all the companies except the last three showing increased receipts from this source. It was in the heavy traffic that the loss of gross revenue occurred, particularly minerals. In neither case, however, could it have been regarded as serious in itself, it was only when added to the growth in expenses that it became important. The falling-off in goods traffic is equal to only 1½ per cent., and that in minerals to 7 per cent.

The wages bill appears to have almost reached a maximum, the increase in that item amounting only to 0.6 per cent. Great stress has been laid upon the effect of the increased cost of coal, and no doubt that has been an important factor, the increase of £652,200 being equal to no less than 28.1 per cent. This, too, follows upon an increase of nearly 30 per cent. in the first half of 1900, so that with the fall in prices which is going on there should be a wide field for future economy upon this item. The cost of material was only a slightly less important factor in bringing about the disastrous results of the half-year, and it is less easy to understand than the rise in the cost of coal, since the prices of steel rails and other iron and steel materials reached the highest point at the end of 1899, and in the first quarter of 1900. The probability is that the materials delivered in the past half-year were under contracts entered into fully a year before.

The increased cost of fuel per train mile run was not owing to larger consumption, but to higher price. The companies have, in fact, all reduced the mileage run, and have, consequently, used less fuel. If the comparison is carried back further, the excessive rise in the cost of fuel is rendered still more striking, since, in the first half of 1899, the average cost of fuel per mile run was only 2.9d., as compared with 5.1d. per mile in the half-year just closed.—*The Economist* (London).

Suez Canal Traffic.

The British Suez Canal directors have reported the navigation through the Suez Canal for 1900, as compared with that of the two previous years. The following is a summary:

The net tonnage shows a decrease of 157,477 tons, as compared with 1899, but an increase of 499,549 tons as compared with 1898. The transit receipts which, in 1899, amounted to $17,624,230 (higher than any previous year), fell to $17,490,356 in 1900.

The number of vessels which passed through the canal was 3,503 in 1898, 3,607 in 1899, and 3,441 in 1900, of which 2,295 in 1898, 2,310 in 1899, and 1,935 in 1900 carried the British flag. There has consequently been a falling off in the tonnage of British vessels, which amounted to 6,297,743 tons in 1898, 6,586,310 tons in 1899, and 5,605,421 tons in 1900. During the same period the tonnage from German vessels has increased from 969,597 tons in 1898 to 1,070,767 in 1899 and 1,466,391 tons in 1900.

Of 2,407 merchant vessels and vessels in ballast, of a net tonnage of 6,612,316 tons, passing through the canal, 1,661 ships, of a net tonnage of 4,705,634 tons, were British, being fully 69 per cent. of the number and fully 71 per cent. of the tonnage; 291, or 12 per cent., were German vessels, whose tonnage was 11.1 per cent. of the whole; France, Holland, and Austria-Hungary combined furnishing a total of 11.8 per cent. of the vessels and 9.6 per cent. of the tonnage of the carrying trade to the East through the Suez Canal.

The mean duration of passage for all vessels navigating the canal amounted to 18 hours and 32 minutes in 1900, as compared with 18 hours and 38 minutes in 1899. In 1900, the percentage of vessels navigating by night was 91.2 per cent., as against 90.7 per cent. in 1899.

The percentage of vessels drawing less than 23 ft. was 58.9 in 1899, as against 62.4 in 1900. The maximum draft allowed for vessels passing through the canal is 25 ft. 7 in., and 302 vessels, drawing more than 24 ft. 7 in., used the canal. It is hoped that before long the maximum draft allowed will be raised to 26 ft. 3 in. In 1890 only 13 vessels passed through the canal with a beam of 49 ft. 2 in. or more. Since 1895, the number has increased as follows: Forty-two in 1895, 68 in 1896, 92 in 1897, 123 in 1898, 159 in 1899, and 212 in 1900.

The number of troops carried through the canal in 1900 amounted to 154,249, as against 108,552 in 1899, being an increase of 29,711 Russian, 28,770 French, 22,634 German, 634 Italian, 587 Japanese, 319 Dutch, and 297 Portuguese, against a decrease of 13,238 British, 8,543 Turkish, 7,891 Spanish, and 7,583 American troops, as compared with 1899. The number of civilian passengers amounted to 102,415 in 1900, as against 88,616 in the preceding year; while the number of pilgrims, emigrants, and convicts was 25,530 in 1900, as compared with 25,179 in 1899. In the year 1870, 26,758 civil and military passengers were carried through the canal; in 1880 the number rose to 98,900; in 1890, to 282,203, as against 221,348 in 1899.

Elevation of Floods in the Lower Mississippi River.*

BY LINUS W. BROWN.

What are the causes of the constant increase in elevation of floods in the Lower Mississippi, why are the maximum floods sporadic; seldom, if ever, occurring in yearly succession, why should the maximum floods increase in elevation when a corresponding increase of discharge is not, by investigation, apparent, and why did the normal flood of 1898, discharging very considerably less volume than the great flood of 1851 or of 1890, require greater flood elevation? The United States Government gaging of May 2, 1898, shows that the elevation of flood was 16.65 ft. on gage, and the discharge of 1,084,000 cu. ft. per second, whereas on Feb. 26, 1890, the flood elevation was 14.7 ft. on gage, and the discharge 1,422,000 cu. ft. per second, which shows that the flood of 1890 discharged 338,000 cu. ft. per second (or 30 per cent.) more water, and at an elevation of 0.95 ft. (or 0.6 of 1 per cent.) less than that of 1898. On March 17, 1851, the gaging as recorded shows a discharge of 1,153,000 cu. ft. per second, with a flood elevation of 14.8 ft. on gage.

All elevations used in this paper will refer to the Carrollton gage of the Mississippi River Commission, zero of which is 20.91 ft. above Cairo Datum or 0.35 ft. below mean ocean level; and all velocities and discharges referred to are those contained in the reports of the Mississippi River Commission. The distance from the Carrollton gage to mean ocean level in Gulf is, for the calculation of slopes, assumed at 120 miles.

The history of the great floods, as recorded, is as follows:

Dates.	Gage reading	Height above sea level	Slope per mile	Velocity	Discharge
1828—April 1	15.20	14.85	0.123	5.90	1,099,000
1849—March 15	15.20	14.85	0.123	5.90	1,099,000
1851—March 27	15.40	15.05	0.125	5.99	1,118,000
1858—May 10	15.10				1,168,000
1859—May 4	15.60	15.25	0.127	6.00	1,156,000
1862	15.90	15.55	0.130	6.68	1,243,000
1874—April 16	15.70	15.35	0.128	6 75	1,175,000
1890—March 13	16.10	15.75	0.131	6.90	1,292,000
1892—June 10	17.35	17.00	0.141	5 87	1,079,000
1893—June 22	17.45	17.10	0.1425	5.82	1,113,000
1897—May 13	19.17	18.72	0.156	7.30	1,350,000
1898—April 25	15.90	15.55	0.130	5.73	1,024,000
1899—April 21	16.00	15.65	0.135	6.81	1,182,000

A careful consideration of the facts showing the increase of elevation of maximum floods, would determine, as conservative, a rate of increase in future of 1 ft. in five years, and it is to be feared, and may be expected, that this increase will be exceeded. Hence, unless means are adopted to thwart the gradual increase of maximum elevation of floods, the levees in 1950 will be 10 ft. higher than at present, under which condition the whole delta will be confiscated for levee protection, and commerce on the Lower Mississippi will be rendered wholly impracticable.

The estimate made by the Government engineers in 1861 for the proper and absolute protection of the alluvial lands along the Mississippi River, from Cairo to the Gulf, in addition to the value of levees then existing, was $17,000,000, and the value of then existing levees was placed at $9,000,000, making the total value of the ultimtae and complete levee system $26,000,000. Since 1861 up to the present time, there have been expended upward of $50,000,000, and the levees are yet incomplete; and to properly protect the alluvial lands against inundation in the future, as far as 1950, the levee system alone, if built at once of proper proportions, will cost upward of $100,000,000, but a very much greater amount will be expended by reason of the work of raising and enlarging the levees. This will necessarily be required to be done gradually and oftentimes as an emergency, and at no time will the alluvial lands be absolutely free from danger of inundation, unless the increase of flood elevations is restrained.

That the "all-levee system" is a necessity no one can possibly deny; but a levee system without other equally important works will in a few years prove a disastrous

*Extracts from a paper and discussion published in the *Journal of the Association of Engineering Societies* for June. The original matter fills 56 pages, and our extracts can only suggest some of the arguments.—EDITOR.

failure. The power and force embodied in the Mississippi River at high floods are such as to be beyond human hands or brains to combat. The only measures that mankind can adopt, with any degree of success, are those which are in line with nature's laws.

I am of the opinion that the suggestion made by Brigadier-General B. S. Roberts, of the United States Army, to reclaim waste swamps along the Lower Mississippi by utilizing the delta-making material of the surplus water of the river, will, with some modification, prove most beneficial to all interests, especially the agricultural and sanitary interests of Louisiana; and I am convinced that such measures will also form a most important factor in maintaining a correspondingly low and permanent elevation of floods, will render unnecessary large future expenditure for levee construction and will provide the greatest possible security against inundation, notwithstanding the fact that the Government engineers in charge of the Mississippi River improvements condemned and criticised the suggestion of Gen. Roberts as having no merit.

The measures I would suggest, as modifications of the plan presented by Gen. Roberts, would be such as not only affect the flood slope of the river and vastly improve the low lands, both from a financial and sanitary point of view, but would further provide an invaluable supply of water for irrigating the land during the low water season, which is not infrequently accompanied by a long season of drouth. To this end, there would be located, at such points as the survey and investigation would best determine, a spill-way of such construction as to be positively free from danger of washing out, the sill of which to be at such elevation as conditions would determine. This spill-way would be connected, by levees across the high ground adjacent to the river, with a large reservoir or basin constructed directly in the low ground or swamps. The size of this basin would be such as conditions may determine, for illustration, say 10 miles long and 5 miles wide, embracing an area of 50 square miles. This reservoir would be constructed by dredges from the inside and the proper levees would be formed around it to such height as may be determined—say of sufficient height to maintain the surface of water at an elevation of 5 ft. above the high land adjacent to river where the spill-way has ceased to run. At such point as may be desired, in the levee forming the reservoir, will be constructed a spill-way to allow the water from the river to pass directly to the swamps, after filling the reservoir. The surface of the swamps will be gradually raised by the deposits from the river water, and any territory desired can be elevated by construction of small levees to direct the flow after the water leaves the reservoir. Thus, at small expense, the whole territory adjacent to the reservoir will be elevated in a few years. In the course of time, say 25 or 30 years, or when sufficient filling has taken place, the spill-way and reservoir could be abandoned and new ones constructed at other points, and thus the alluvial territory along the river would be constantly elevated, co-extensive with, and perhaps at a greater rate than the increase of elevation of floods from natural causes.

DISCUSSION.

Mr. H. B. Richardson—This paper announces conclusions as to the height of future floods in the Lower Mississippi River, and the consequent dangers impending, which, if correct, must be regarded as appalling. It appears that a "consideration of the facts . . . would determine as conservative a rate of increase in the future of 1 ft. in five years," so that the levees required to restrain the flood "in 1950 will be 10 ft. higher than at present"—and presumably 20 ft. higher in the year 2000.

The author proceeds to show the "rate of increase of future maximum flood elevations." For 46 years of the period included in his table he finds it only a foot in 90 years, while in the next 23 years it goes up to the alarming rate of a foot in 6½ years, the last 7 years of which period has rushed on at the fearful rate of a foot in about 2½ years. He fails, however, to note that during the last two years included in the table there has actually been a *decrease* at the rate of almost a foot in 7½ months. Nor does he mention the fact, shown by the table, that the increase from the beginning to the end of the period covered, is only a foot in 88¾ years, or about the same as that given for the first 46 years. This can be compared only to the conclusions of another experienced observer, Mr. S. L. Clemens, in which he shows, from the rate at which the river is being shortened by cut-offs, that the corporate limits of New Orleans and Cairo must overlap each other at some future date, not now recalled by this writer, but probably about the same time that the levees here are built 10 ft. higher than at present.

Considering the relative opportunities enjoyed by the several investigators for collecting full data and for comprehensive discussion of the whole subject, the present writer is inclined to accept the more moderate conclusions of Humphreys and Abbot and the Mississippi River Commission, rather than the startling predictions of the author.

Mr. B. M. Harrod—No conclusion concerning the increase or decrease of floods can be reached by an examination of recorded gage heights at Carrollton without a study of the effect of the crevasses.

The evidence of any present change in flood heights other than that accounted for by building of levees is entirely inconclusive. The author is of the opinion that the floods of the future will not increase, but may decrease. The reasons given, connected with the breaking up of ground for cultivation and the extension of irrigation, are probably good, as far as they go, for the western tributaries. But it is hard to believe that the extensive deforesting of the western slopes of the Alleghenies can fail to increase the rapidity and thoroughness of the run-off from these mountains, making the high water higher and the low water lower.

Gen. Barnard, who was not only one of the ablest advocates of the reclamation of the alluvial valley by levees, but also the first and for a long time the only United States engineer who advised the improvement of South-pass by jetties, thus expressed himself in a criticism of Gen. Ellet's plan of outlets:

"The idea that levees have any tendency to cause a rising of the bed is so simply absurd, so destitute of a single reason to justify it, that it hardly seems necessary to allude to it. It is the want of levees, and that alone, which can cause such a rising, and in proportion as the water is let out from its confinement by levees, by means of crevasses or 'outlets,' will the bed of the Mississippi River be elevated.

"There is but one protection to Louisiana, and that is levees; outlets or lateral vents of any kind may be discussed, adopted by State authorities, perhaps attempted. If so, they will certainly deluge the unfortunate district through which their discharge is carried, while they utterly fail to relieve the river; producing, on the other hand, deposits in its bed, which they will eventually raise, and with it the surface.

"In brief, to take waters from the river channel and to throw them into the lateral basins, lakes and bayous is to take them from the channel by which they can, with the most ease and safety, be carried to the sea to put them into basins, unsuited by their slope to carry off the floods thrown upon them."

Mr. William Joseph Hardee—There is so much fallacious reasoning in the paper before us, appealing strongly as it does not only to the layman, but to the inexperienced engineer as well, that the writer feels it a duty he owes to the community in which he lives to exercise his best effort to defeat the circulation and acceptance of such unsound doctrines. No reliable conclusions concerning that part of the subject relating to increasing flood heights can be deduced from a study of the river at any one particular point, or of a very short length of it. After a careful consideration of the paper before us, the writer is forced to the conviction that its author undertook to discuss his subject with a preconceived *theory*, and in an endeavor to establish the correctness of that theory he has either failed to make proper research to inform himself fully or else he has ingeniously avoided reference to and consideration of such data as are properly germane to the subject, reviewing and employing only such data as he believed would support his theory. As far as employing data is concerned he fails to go beyond the Carrollton gage, using only some controvertible data acquired at that gage upon which to base his theory. Where he does venture beyond the Carrollton gage his conclusions are mere opinions, unsupported by even apparently trustworthy data.

As the writer cannot admit that a calamity threatens, he will not indulge in a discussion of relief measures, but will confine his attention to a disproval of the conclusions reached by the author.

It may not be out of place, at this time, to remark that the question of utilizing the sediment carried by the waters of the Mississippi River for the upbuilding of the lowlands in the alluvial valley is one which is not altogether without merit, but the writer feels that it is a matter which time and circumstance will develop. The cost of the work incident to such an accomplishment would at this time so far exceed the value of the lands reclaimed as undoubtedly to render the project impracticable. The population of Holland averages 401 persons to the square mile, and such density of population enhances the value of land to a degree which justifies the large amount of money invested in dikes, extensive drainage canals and gigantic pumping stations to reclaim the land and protect it against inundation.

In Louisiana, the 15 riparian parishes in the alluvial valley, the parish of Orleans included, average 71 persons to the square mile. In some of the parishes containing the largest areas of very low lands, the population per square mile is as small as 7 to 19 persons. Considering the present small value of lowlands in the alluvial belt, and the large tracts of cheap land available there for cultivation, it may be readily appreciated that our country has not yet reached a stage in its existence at which the expenditure of large sums of money is justified in reclaiming low, ill-drained lands. When such time arrives, some method, perhaps along the lines suggested by the author, will be employed to render lowlands available for agricultural pursuits.

One of the most remarkable of the statements in the paper under discussion is that the development and improvement of the watersheds of the Mississippi River and its tributary streams will decrease the maximum volume of future floods. The writer has always believed—in fact, has never before known the proposition to be challenged—that the deforestation in the great watersheds and the improved drainage of lands there, must necessarily cause retention of less of the rainfall by the soil, but will affect its more rapid delivery to the main drainage arteries, resulting in not only greater volume in the Mississippi, but temporary increased height, because of the rapid assemblage of waters in that stream.

If the river will do, naturally and by slow degrees, what the author says it will do, why should it not do so just as effectively, yet more rapidly, with the assistance of artificially elevated banks? The writer is firmly convinced that the levee system is a success; that it is performing its mission well, and will continue to do so; that it will in time prove the means of increasing the carrying capacity of the river; and, that floods of a given volume will pass to sea level at lower elevation than formerly.

Street Railroad Spotters.

[From the *New York Herald*.—Condensed.]

One who for years was a spotter for the Metropolitan Street Railway Company tells this story of the daily life of a spy whom even his employers do not trust. The corporation, which spends $80,000 a year on its secret service, holds that every conductor is a knave until his innocence is proved, but the spotter is never able to establish his own honesty. The man who is hired to find out the sins of others is himself subject to continual espionage. The spotter watches the conductors, motormen, inspectors and transfer agents. He in turn is shadowed by the head spotters, who are pursued by private detectives.

The spotters catch one out of every five of the conductors in the act of taking the company's nickels, yet only a part of the offenders are brought to book. The man who hires all the spies is known as the paymaster. The spotters never go near the offices of the company. The spotter must first of all be a good actor. He must pretend to be indifferent. He must not keep his eye glued on the register. That would proclaim his occupation from the start. He must take a quick glance at the dial as he steps into the car. If he can do it as he is on the step or before, so much the better. Then he must pay no attention to the figures on the dial until he leaves the car. As soon as he is in the car he must keep account in his head of the fares rung up and of the fares which the conductor receives. He must not make any notes while in the car.

Every spotter is supposed to take twenty-five rides a day, of twelve minutes each. He is required to get off the car after a ride and walk or rest for five or six minutes before boarding another car. He works seven days a week. He doesn't labor more than three hours on Sunday, as a general thing. Observant passengers send in many reports on that day. His duties require him to work one night a week, practically the entire night. It is expected that the spotter shall distribute his attentions over the various lines of the company. For the first month of his employment he follows a prescribed schedule.

The dishonesty of conductors is of two kinds, "honest" and "dishonest." Whenever you hear a conductor say that he is working "honest" you will understand that he is dishonest only when the chances of detection are slight. Two of the most successful spotters ever employed by the company were Japanese students. They made such thorough reports that they were made special inspectors at three dollars a day, and they only worked six hours.

The fare of a drunken man is regarded as fair game by the conductor who, as he calls it, is working honest. For that reason spotters who are out late at night often pretend to be half drunk. I knew a man once who reached the height of foolhardiness. I boarded his car at the beginning of Broadway. He had plenty of passengers, yet he had not rung up a fare. He did not touch the register handles until he got to Eighth street, although he had collected from thirty persons. . . .

A scheme often used is the ringing of the motorman's bell on the rear platform instead of the register bell. The motorman on the platform in front will not tell on the conductor, who may give him a small part of his perquisites.

Spotters also look after conductors who miss fares. Many men have been discharged for that. The third of the three cardinal sins is giving the bell too quickly. The company will not keep a man long who is detected doing that. The quick starting of a car means that some one is likely to be thrown violently to the ground. The spotters show no mercy to men who are too quick with the bell.

The spotters also report conductors for lack of civility. The conductor who fails to help an old woman on the car or to lend assistance to a woman with a baby in her arms gets a black mark. By the way, most of the very civil conductors are sooner or later detected in the act of taking the company's money. In my experience, the cross, crabbed old fellows are honest.

A conductor must not forget that he must be neat in his appearance. On Sunday he must have a shave and a clean collar. I would report any man who failed to do that on Sunday. The conductor must not try to have sport with green motormen.

Other employees of the company fall under the sharp eyes of the spotter. The spotter reports the motormen for jerking the car and not stopping for passengers. The transfer agent must keep his eyes open. He must not give transfers to any spotter who has no right to such a ticket. There was an agent at a prominent crossing who gave twenty-five and thirty free transfers a day to his friends and acquaintances. Even the inspectors are carefully watched. They are reported chiefly for going into saloons and for blackmailing young conductors.

When a spotter reports that a conductor is stealing fares the company does not take his word for it. A head spotter is told to watch that conductor for a week. In some cases the conductor, if he has been long in the employ of the company, is merely lectured and fined for "carelessness" in not ringing up the fares. Even the word of the head spotter is not always accepted. The company, when the matter resolves itself into a question of the veracity of an old employee and a spotter, or even a head spotter, is inclined to give the conductor the benefit of the doubt.

It is the chief duty of the head spotter to see that the spotters are attending to their business and are not in league with the men. Who guarantees the honor of the detectives I am sure I do not know. . . . The spotter is regarded as an outcast. The public is really more in sympathy with the conductor who is working "honest" than it is with the spotter who is trying to place a premium on real honesty.

Fire at Council Bluffs.

One thousand two hundred feet of the freight sheds at the Union Pacific Freight Transfer, Council Bluffs, Iowa, were destroyed, Aug. 20, by fire, which also burned 30 freight cars and damaged 50 more to a greater or less degree.

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.
PUBLISHED EVERY FRIDAY
At 32 Park Place, New York.

EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

ADVERTISEMENTS—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

Returns from 165,000 miles of railroad, giving gross and net earnings for the half-year to June 30, have been compiled by the *Chronicle*. The gain in gross was 10.34 per cent. and in net 14.50 per cent., as compared with the first half of 1900. In four half-years beginning with 1898 the gains in gross aggregate $220,000,000; the gains in net for the same four half-years were $82,000,000.

The failure of a trestle bridge near Sabine Pass, Tex., on August 8 reveals what appears to have been the work of the teredo in fresh water. A train consisting of engine, seven freight cars and two passenger cars, moving at moderate speed, broke through the trestle, and the whole train fell into Keith Lake Gully. Fortunately, the rear passenger car, the one containing most of the passengers, was only partly submerged, and the passengers in it were not seriously injured. Those in the other passenger car came very near being drowned, but all were rescued by men from a tug which happened to be near, and there were no very serious personal injuries. An officer of the road, the Southern Pacific, informs us that there are many trestle bridges over tributaries of the Sabine River in that region and that trouble from the teredo has hitherto been unknown, the water having always been fresh. Piles taken out after standing 18 years are found absolutely sound below the water line. The piles of the bridge which failed proved, however, to have been badly eaten by the teredo about 18 inches below the low water mark. The freshness of the water was looked upon as a certainty and the piles of these bridges have not been regularly examined below the low water mark. The bridge in question was subjected to the ordinary inspection about three months ago and was then in perfect condition down to the line of low water.

At Buffalo this week the anti-trust law was applied to the railroads with full vigor; with a suddenness, indeed, which must have felt to the railroad men present in court like an emergency application of air-brakes on a 100-car freight train. The press despatches, from which we get our report (printed in another column) seem to indicate that Judge Hazel looked upon the Trunk Line Association as a veritable pool, of the most comprehensive type; but as the decision is not given in full it is not safe to draw conclusions as to the precise grounds on which it is based. It is an open secret that the Lackawanna and the other roads from Buffalo to New York maintain a pool or its equivalent on grain carried between those cities; but that is not interstate traffic, and is not subject to Federal laws. That there is a pool on any traffic other than this grain has not even been charged, by any responsible party, so far as we are aware. The decision seems to refer to a passenger pool; but even if there were such a pool, it is not certain that it is unlawful. Section 5 of the Interstate Commerce law is understood by most persons, we believe, to prohibit pools (a) of freight; (b) of earnings, either passenger or freight; and nothing more. To equalize passenger traffic is not to pool passenger earnings. The anti-trust law, however, prohibits nearly everything, except breathing, and the defendants in the Buffalo case probably had no difficulty in showing that whatever passenger agreements are in existence among the railroads are intended to apply to interstate traffic as well as that from New York to Buffalo. In condemning the roads for agreeing on conditions which shall be enforced in selling excursion tickets, Judge Hazel stands on the solid ground of the Congressional statute (the Sherman anti-trust law) and of Justice Peckham's decision sustaining that law in all its rigid unreasonableness. The conditions in a ticket may not be shown to influence competition a millionth of one per cent., but an influence which is too small to measure still is enough to come within the terms of the law. Perhaps the most surprising thing about this law, and the relation of the railroads to it, is not that Judge Hazel should now bring it to bear, in an unexpected quarter, but rather that all the other courts should have so long ignored it. No district attorney has invoked it in any suit of importance, so far as we have observed. In thus ignoring the Sherman law the courts and lawyers are, indeed, following the dictates of common sense; but that is just what the law tells them not to do.

Four-Cylinder Tandem Compound Locomotives.

There is shown in this issue a locomotive design that marked a radical departure at the Schenectady Locomotive Works. Readers of the *Railroad Gazette* know that the Schenectady Locomotive Works have followed the possibilities of outside-connected two-cylinder compounding practically to its limit as that limit is fixed by the clearances of the permanent structures. We have from time to time given some good examples of heavy two-cylinder compound locomotives of advanced design, notable among these being the New York Central's Class G-1 freight locomotives, the cylinders of which are 23 in. and 35 in. x 34 in. These engines were described in our issue of March 1, page 140, and the performance of one of them was given with a profile of the Mohawk Division, April 26, page 286. The work done by these locomotives is satisfactory, the performance here referred to being particularly creditable and even heavier work has been done by the class. A somewhat general impression was expressed by one who had part in this design, when he said "those low-pressure cylinder dimensions nearly touch the top notch in two-cylinder compounding." There is still some margin, however, for increase in the size of low-pressure cylinders of two-cylinder compound locomotives. Recent orders tend to confirm the latter impression.

With no particular reason assigned for it the scant consideration that has hertofore been given the four-cylinder tandem compound in this country is not easy to understand. The Johnstone compound locomotive, designed in 1889 by Mr. F. W. Johnstone, Superintendent of Motive Power of the Mexican Central Railway, does not come fairly within the tandem type, but its ultimate reciprocal action was so nearly like that of the tandem that it should not be ignored when the tandem idea is considered. We illustrated the Johnstone design May 22, 1891, page 350, and gave results of a test made by the Mexican Central Railway. On Aug. 26, 1892, page 632, and Oct. 14, page 767, we gave results of tests made with one of these engines for Mr. D. L. Barnes, by Mr. F. M. Whyte. Very comprehensive data were given and indicator cards taken under many conditions were shown. Our readers may recall that this engine had three piston rods secured, in the same vertical plane, to each cross-head. The high-pressure piston was central within the annular low-pressure piston and a separating wall, and had one piston rod. The low-pressure piston had the other two rods attached to it above and below the high-pressure rod. The combined power exerted upon the cross-head was therefore delivered very much as though from one ordinary piston rod and therein was the resemblance to the tandem principle.

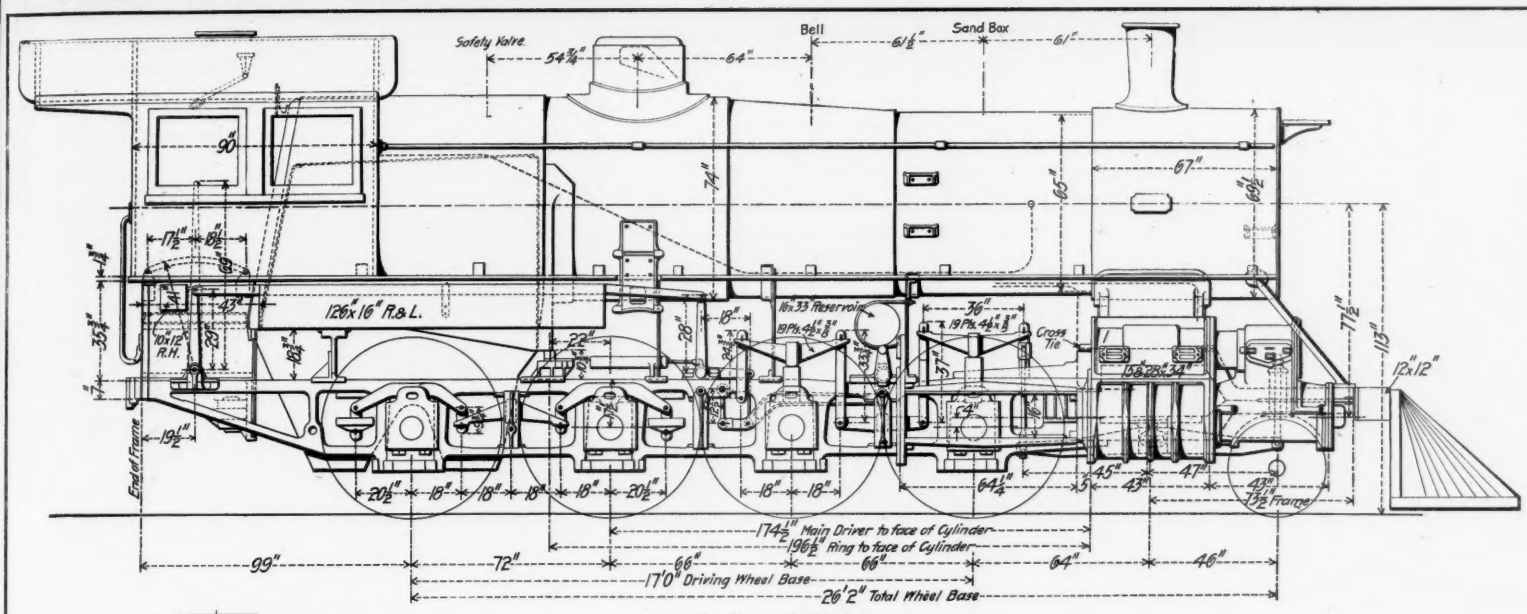
Beyond the seven months' trial of the Dunbar engine, on the Boston & Albany Railroad, in 1883, and the experiments made with a Brooks tandem, designed about eight years ago, and still working on the Great Northern Railway, there has been no important recognition of four-cylinder tandem compounding in the United States except in the operations conducted in 1899 by Mr. John Player, Superintendent of Machinery on the Atchison, Topeka & Santa Fe, with engines of this type which he designed. The complete record of some extended road tests of one of those consolidation engines was published in the *Railroad Gazette*, June 16, 1899, with illustrations and data including indicator cards showing a wide range of service. The showing there made was very creditable and the economy was as great as it is believed possible to attain in mountain service. The five freight engines and two passenger engines of that railroad have been working steadily to the present time, and faith in the correctness of the main principle involved is now evinced by the Santa Fe in placing an order for 40 of the Schenectady tandems, which are being built at the Providence Works of the American Locomotive Co. The Baltimore & Ohio Railroad has just received one four-cylinder tandem compound consolidation locomotive from the American Locomotive Co., to be used for experimental work on the road.

The margin of economy that is possible or even the greatest economy that is claimed from compounding in average service the country over while very large in the aggregate is so small trip by trip that every possibility of reducing this margin should be carefully guarded against. This brings us to a feature of the Northern Pacific valves that we wish to discuss from the standpoint of the learner rather than of the critic.

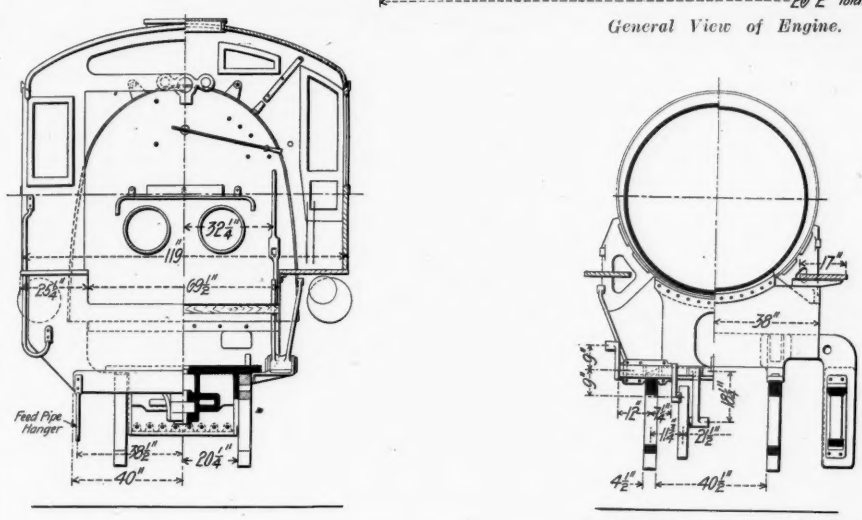
The valves are cut out to an inside clearance of ¼ in. on the high-pressure and ⅜ in. on the low-pressure valves. Other examples of large clearance are now quite common, but chiefly in high speed engines. Presumably these large clearances are intended to facilitate drifting and relieve compression, but it is not apparent why so much is required. Doubtless those ends will be served, but it would seem that a needless consumption of steam would result from too early release, particularly in freight work at relatively slow speed. We have closely observed tandem compound engines having 57-in. driving wheels; cylinders 15 and 25 x 28 in.; piston valves 7½ in. in diam. on high-pressure cylinders and 9 in. diam. on low-pressure cylinders, set line and line in full gear, both motions; ⅞ in. outside lap; 3-16 in. inside clearance on high-pressure and line and line inside on low-pressure, with 6½ in. travel in full gear. These drifted freely and rapidly enough for all safe purposes and could even be run at a speed that is not good for revolving parts. For the sake of the example, just here it is admitted that such an engine has been allowed to run down a straight bit of grade at the rate of 57 miles an hour, to try out the limit of drifting without distress in the cylinders. This, it may be noted, is at the rate of about 342 revolutions a minute and is too fast for regular work with a consolidation engine. There was, however, no sign of disturbance except in too great vibration of the track, and corresponding indications that the counter-balance weights were not intended for such speed.

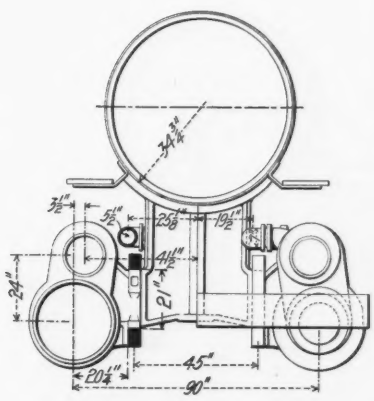
To relieve high compression by increasing the exhaust clearance is simple enough but it is an expedient that should be used sparingly. We have known 1-32 in. additional clearance to make such inroads on the coal pile on a light fast passenger run that the valves had to be restored to line and line inside, regardless of some excessive compression with piston valves on a simple engine. Likewise, with the class of engine of which some of the dimensions were given above, 1-16 in. additional clearance cut out experimentally, thus making the clearance ¼ in. on the high-pressure and 1-16 in. on the low-pressure valve so weakened the engine that it stalled at the maximum pull it had previously made. The careful use of indicators will readily establish the correctness of these statements and we offer them here with the view of trying to narrow down the question of what is most expedient under given conditions.

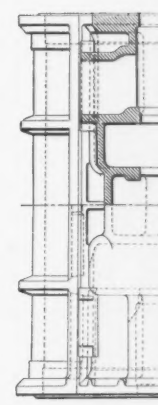
The Schenectady tandem design as a whole is a skillful and courageous attempt to further the science of compounding locomotive cylinders, and everybody will wish for the success of this first considerable order. There is no type of engine in this country that will be more carefully observed than this, and it is to be hoped that the Northern Pacific may soon find it possible to make known the practical results.



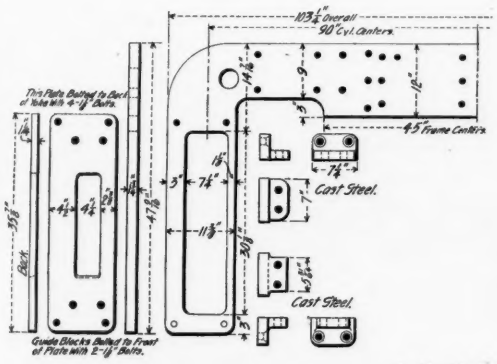
General View of Engine.

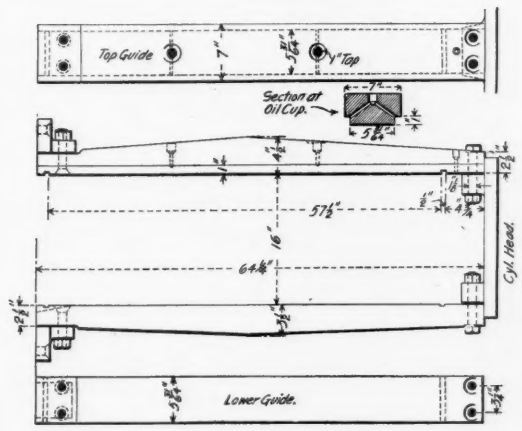




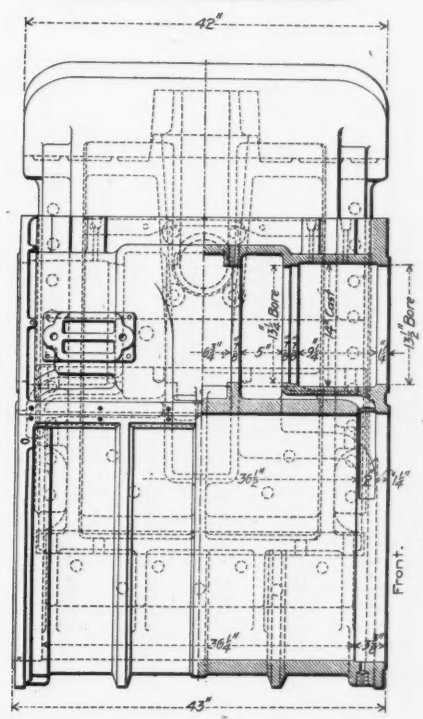


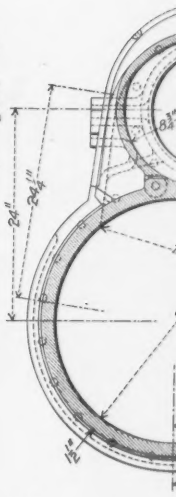
Engine Elevations and Sections.

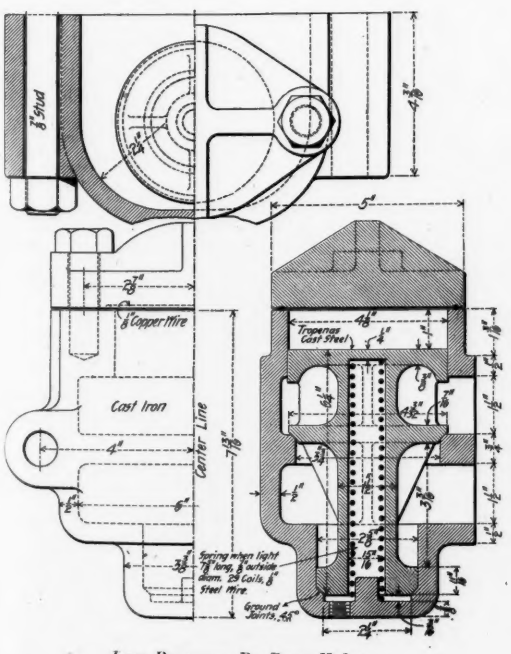


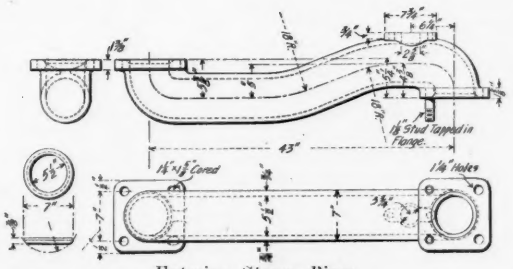


Guide Yoke and Guides.

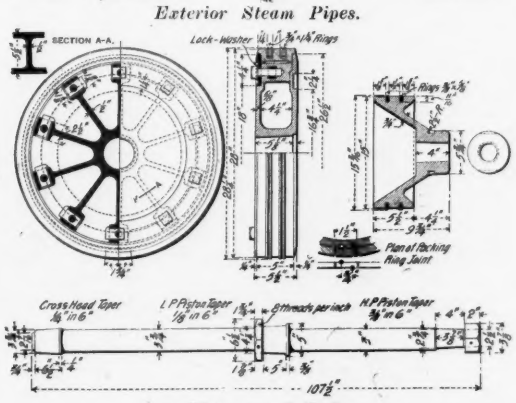






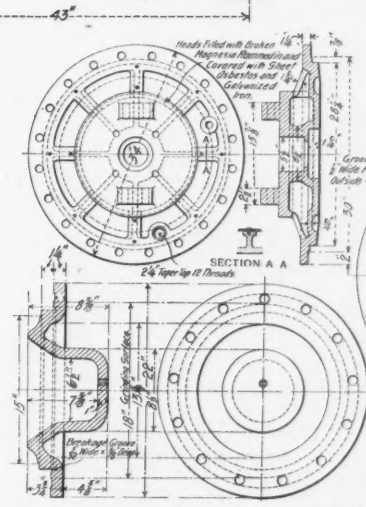


Exterior Steam Pipes.



Low-Pressure By-Pass Valve.

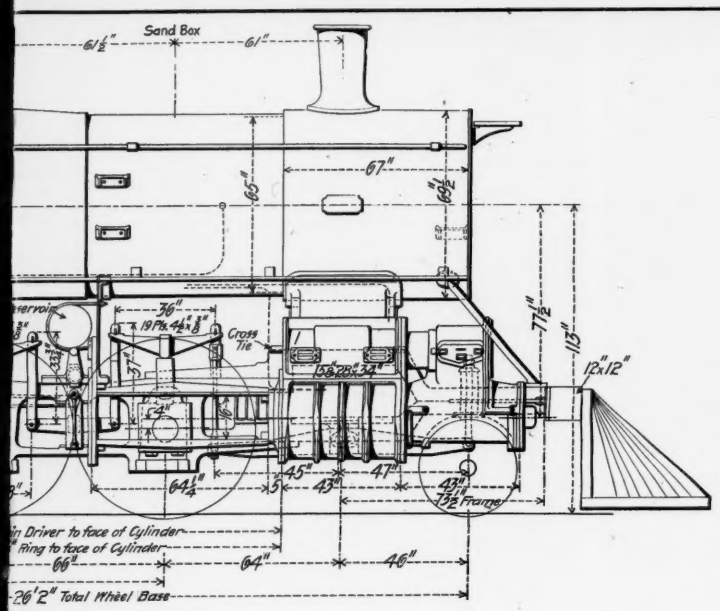
Pistons and Rod.



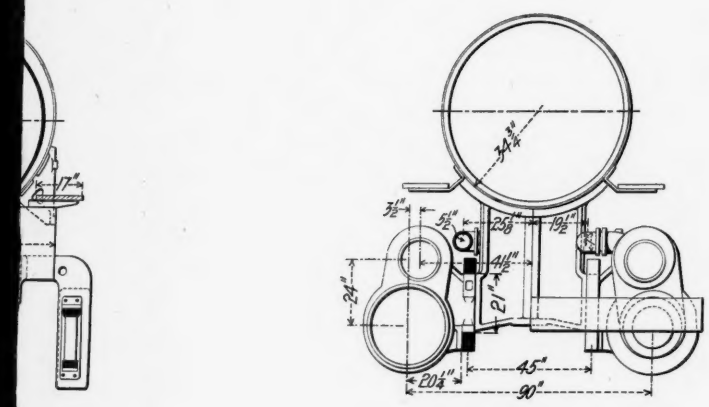
Cylinder Heads.

Built by the AMERICAN LOCOMOTIVE COMPANY. MR. J. E. SAGUE, *Mechanical Engineer.*

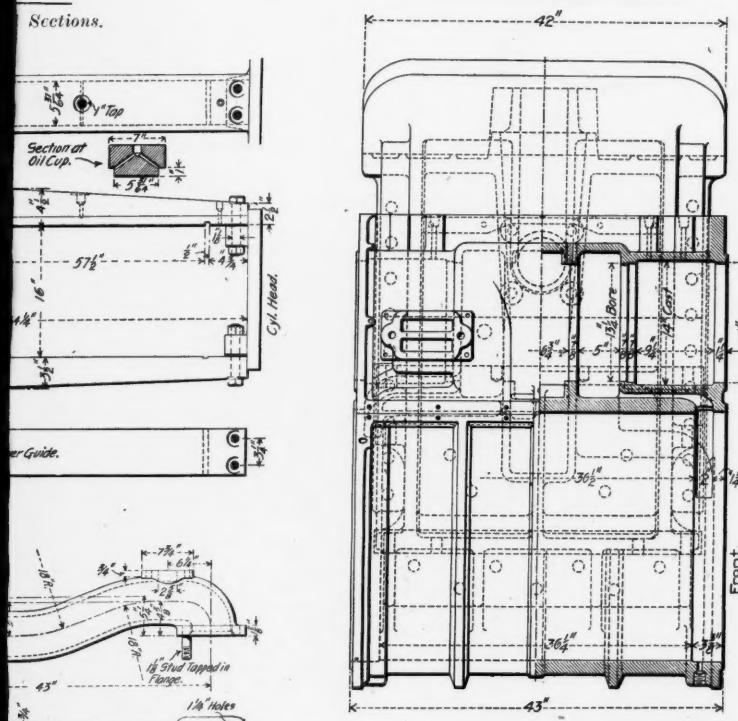
SCHENECTADY FOUR-CYLINDER TANDEM COMPOUND CONSOLIDATION LOCOMO



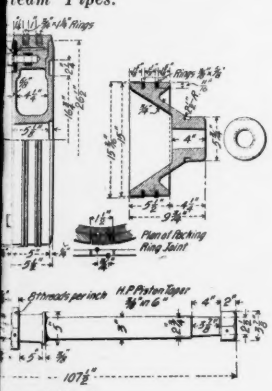
Engine.



Sections.

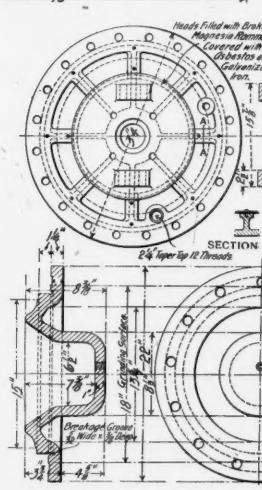


Steam Pipes.



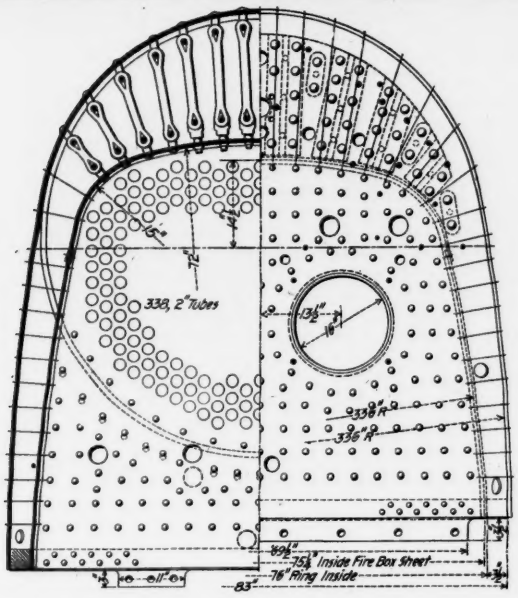
Rods and Rod.

Engineer.

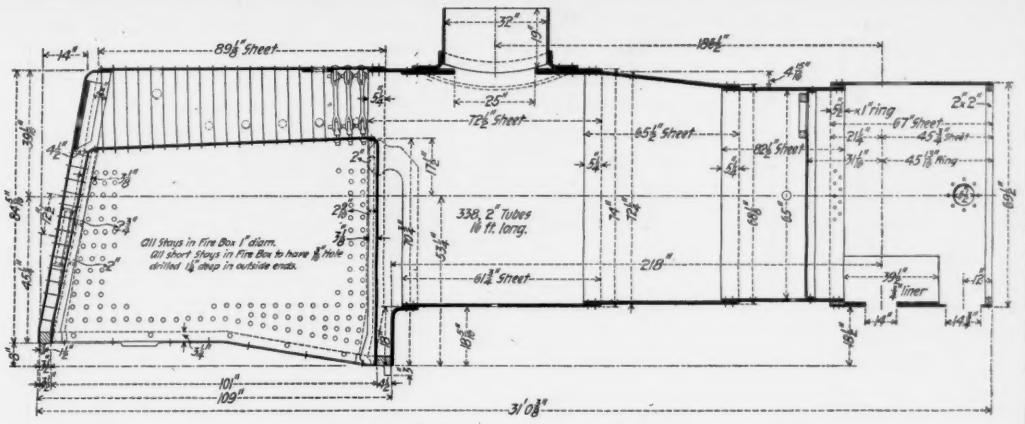


Cylinde

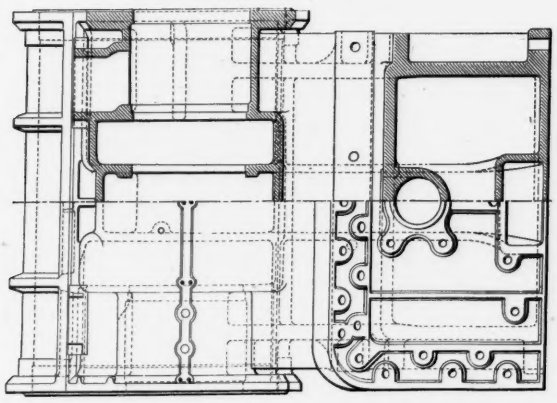
SCHENECTADY FOUR-CYLINDER TANDEM COMPOUND CONSOLIDATION

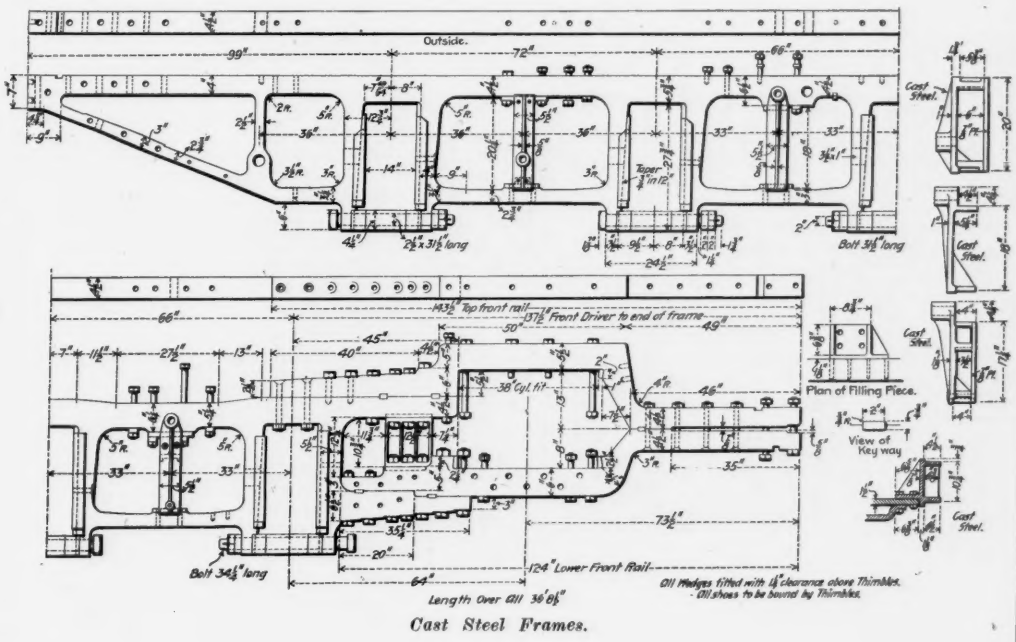


Cross Section and Elevation.

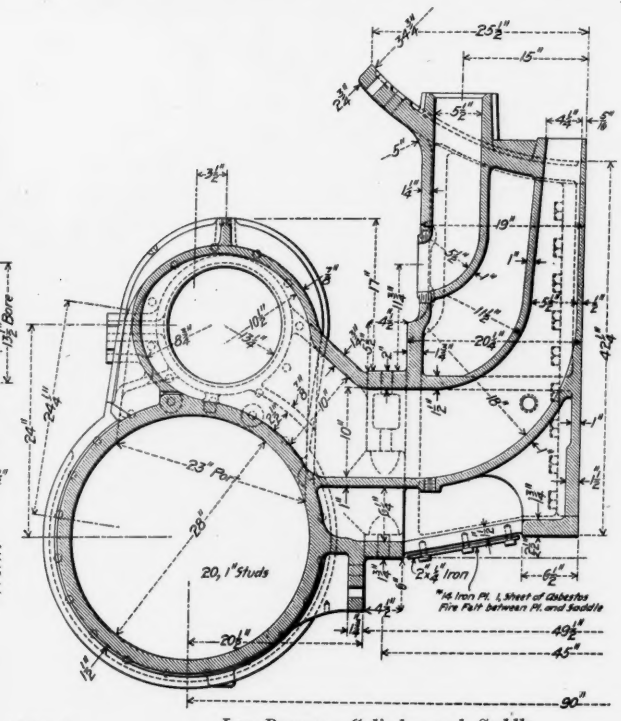


Longitudinal Section of Boiler.

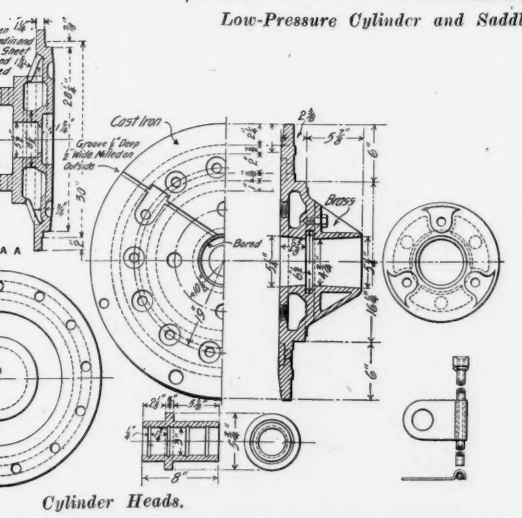




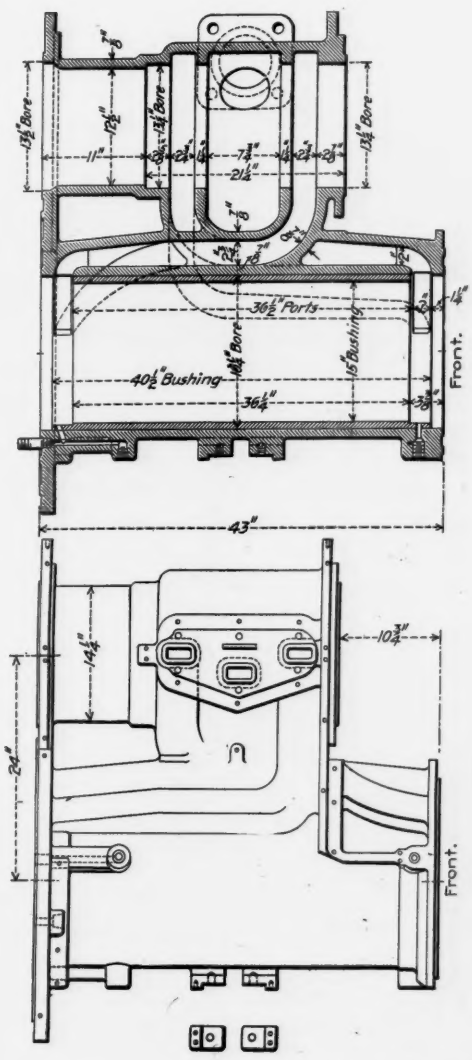
Cast Steel Frames.

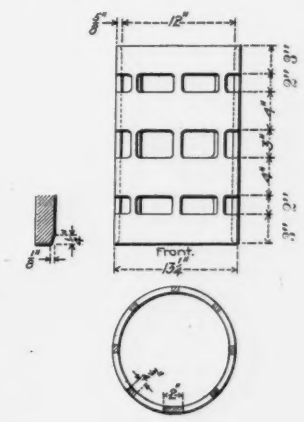


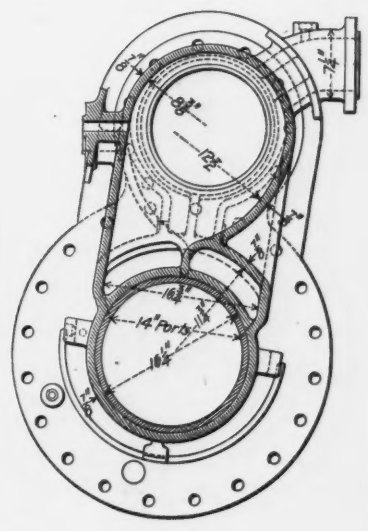
Low-Pressure Cylinder and Saddle.



Cylinder Heads.







High-Pressure Cylinder.

OLIDATION LOCOMOTIVE—CLASS Y-2, NORTHERN PACIFIC RAILWAY.

MR. ALFRED LOVELL, *Superintendent of Motive Power.*

Annual Report.

Erie Railroad.—The report of the Erie Railroad Company for the year ending June 30, being the sixth report of the reorganized company, appeared last week. It is a particularly interesting document for several reasons. It is the last report to be made under the presidency of Mr. Thomas, who, indeed, signs this report as Chairman of the Board. It shows something of what has been done under that administration to build up the property, put it on a sound financial basis and prepare it physically for efficient and economical working. Of course, in a document so concise as a railroad report must be, all of this can be shown only by figures and suggested by very brief statements, and the reader must draw upon his own knowledge and ingenuity to get the lessons.

Furthermore, this report suggests something of what must be done to insure and enlarge the prosperity of the company. It is quite impossible to summarize the numerous improvements that have been effected, that are under way and that are suggested. One must read the report itself to get the details. But these include not only the improvements of line, grade, track, equipment, yards and buildings, but also new lines, cut-offs, running arrangements with other companies and absolute purchase of important properties. The expenditures of the last few years in all of these items have been very heavy, and the results in economy of operation appear in the report, but it is the opinion of Mr. Thomas, and, of course, the opinion of others who have close knowledge of the property, that similar and even greater expenditures must still be made from funds to be raised and charged to capital account. Indeed, we have heard Mr. Thomas say that probably 30 millions could be advantageously used in this way. In this report he says that the improved physical condition of the property and the increase in earnings resulting therefrom indicate that the day is now near when arrangements for new capital may be profitably made and the operating expense account relieved of extraordinary charges.

Before going on to consider specific items of the report we may group in a table certain general results. The miles worked on June 30, 1901, were 2,318, but the average for the year was as in the table below:

	1901.	1900.	Inc. or Dec. p. c.
Earnings:			
Miles worked	2,156	2,109	
Freight	$20,247,910	$20,152,762	I. 0.5
Coal	9,037,086	8,675,226	I. 4.2
Passenger	7,278,054	6,905,224	I. 5.4
Mail, exp. and rents	1,305,497	1,229,187	I. 5.8
Miscellaneous	1,233,756	1,330,632	D. 7.4
Total gross	$39,102,302	$38,293,032	I. 2.1
Expenses:			
Maintenance of way and structures	$4,288,895	$3,974,618	I. 7.9
Maint'ance of equipment	6,057,250	6,889,647	D. 12.1
Conducting transp'tation	16,138,787	15,806,021	I. 2.1
General expenses	852,647	780,796	
Taxes	1,069,395	997,523	I. 7.4
Totals	$28,406,974	$28,448,605	D. 0.15
Net earnings	$10,695,328	$9,844,427	I. 8.6
P. c. of expenses	72.65	74.29	
P. c. omitting taxes and betterments	66.57	68.55	

The increase in freight earnings (small as it is) was in spite of a less movement. The ton-miles of merchandise freight fell off 3.35 per cent. to 3,151 millions, but the rate rose from 6.18 mills to 6.43 mills, or 4 per cent. The coal moved was 1.839 million ton-miles and was 3.12 per cent. less than the year before. Here again, however, the ton-mile rate rose from 4.57 mills to 4.91 mills, or 7.44 per cent. Incidentally, it will be observed that the coal tonnage of the company was over 47 per cent. of the total tonnage hauled and the gross earnings from coal were 23 per cent. of the total gross earnings. Summing up the merchandise and coal traffic the general freight traffic fell off 3.26 per cent. to 4,990 million ton-miles. The ton-mile rate was 5.87 mills, which was 5 per cent. higher than the average of the year before. Thus, notwithstanding the diminished movement there was an increase in the freight earnings. There was also an economy in movement. The ton-miles of general freight fell off 3.26 per cent., but the freight train-miles fell off 4.85 per cent. and amounted to 13,300,000. The train-mile earnings from all freight were $2.20, as compared with $2.06 the year before, a gain of 6.76 per cent. The average trainload increased 1.67 per cent. to 375.16 tons. Including the company's freight the average trainload was 400.22 tons. The average number of tons in each loaded car was 16.89, as against 16.73 the year before, or including the company's freight the average carload was 18.02 tons. The average trainload on the Erie proper was, of course, much heavier than on the entire system and reached in the year under consideration the high figure of 451.69 tons, and the tons per loaded car amounted to 18.23.

We have seen that the earnings from passengers carried gained 5.4 per cent. This was partly the result of a greater movement and partly of a higher rate. The passenger-miles amounted to 469,670,000 and the gain was 5.26 per cent. The passenger-mile rate was 1.55 cents as against 1.548 the year before, the increase in this figure having been quite trifling. There was a gain in earnings of 4 cents per passenger train-mile, which reached $1.05. It is but a few years ago that Mr. Roberts, then the General Passenger Agent, was laughed at by some of the higher officers of the system when he promised to put passenger train earnings up to a dollar a mile.

The increase in the expense item of maintenance of way and structures was due to the continued heavy expenditures necessary for the economical conduct of business. Thirty iron bridges were renewed, several bridges and culverts were replaced by metal structures or filled in and the report contains a long list of items of improvements in signaling, buildings, track and other particulars. It will be noticed that the item of maintenance of equipment fell off very materially, due to the fact that the equipment had been brought to pretty good condition and that the application of safety appliances had been practically finished. During the year air-brakes were applied to 3,646 freight cars at a cost of $230,610, or $63 per car.

Considerable equipment was, however, purchased and charged to capital account. During the year this charge amounted to $2,817,000, being partial payments on a considerable number of freight cars and payments for 10 freight locomotives. From Dec. 1, 1895, to June 30, 1901, the sum of $10,899,000 has been paid out for new equipment and charged to capital account. This covers 114 locomotives, 12,000 box and coal cars, besides minor equipment. In addition to these capital expenditures the original tonnage capacity has been more than kept up out of charges to working expenses.

From December, 1895, to June 30, 1901, the Erie Railroad Company received in cash from all sources and devoted to construction and equipment the sum of $13,555,000. Of this more than 11½ millions was devoted to new construction and new equipment and $7,600,000 put into equipment alone. The most compact way of showing the changes that have been brought about since the reorganization is by reprinting in part a table which is found on page 55 of the report as below:

TRAFFIC EARNINGS AND EXPENSES SEVEN MONTHS AND FIVE YEARS.

	1896. 7 Months.	1897.	1898.	1899.	1900.	1901.
Miles operated	2,098.113	2,124.937	2,124.337	2,109.437	2,109.437	2,155.737
Freight Traffic:						
Tons of general freight one mile	1,456,907,499.	2,658,587,494.	3,117,611,646.	3,189,734,949.	3,259,989,754.	3,150,581,872.
Tons of coal one mile	699,686,095.	1,281,091,681.	1,438,737,661.	1,645,040,334.	1,898,166,221.	1,839,000,116.
Tons of all freight one mile	2,156,593,594.	3,939,679,175.	4,556,349,307.	4,834,775,283.	5,157,955,975.	4,989,581,988.
Total freight earnings	$12,687,557.	$23,476,583.	$25,440,903.	$25,009,423	$28,827,988.	$29,284,996.
Earnings per ton per mile	Cents .588	Cents .596	Cents .558	Cents .517	Cents .559	Cents .587
Earnings per mile of road	$6,047.	$11,048.	$11,975.	$11,855.	$13,666.	$13,584.
Earnings per train mile	$1.324	$1.645	$1.675	$1.636	$2.062	$2.201
Tons of freight in each train	225.10	276.19	300.04	316.46	369.00	375.16
Tons of freight in each train, including company's material	.....	291.09	312.69	335.46	392.32	400.22
Tons of freight in each loaded car	12.88	13.94	14.84	15.78	16.73	16.89
Passenger Traffic:						
Passengers one mile	186,070,922.	370,028,876.	383,390,464.	409,987,217.	446,190,767.	469,670,388.
Revenue from passengers	$3,104,350.	$5,742,807.	$5,957,703.	$6,310,443.	$6,905,224.	$7,278,053.
Earnings per passenger mile	Cents 1.668	Cents 1.552	Cents 1.554	Cents 1.539	Cents 1.548	Cents 1.550
Passenger earnings per mile of road	$1,751.	$3,191.	$3,345	$3,542.	$3,871.	$3,994.
Passenger earnings per train mile	Cents 81.067	Cents 84.058	Cents 87.422	Cents 91.380	$1.00745	$1.04478
Earnings and Expenses:						
Freight and passenger earnings	$16,363,058.	$30,258,551.	$32,547,154.	$32,481,388.	$36,994,644.	$37,895,098.
Freight and passenger earnings per mile of road	$7,798	$14,239.	$15,321.	$15,398.	$17,537.	$17,578.
Gross earnings, all sources	$17,017,376.	$31,497,030.	$33,740,860.	$33,752,703.	$38,293,031.	$39,102,302.
Gross earnings per mile of road	$8,110.	$14,822.	$15,883.	$16,000.	$18,153.	$18,138.
Operating expenses and taxes	$12,877,423.	$23,332,242.	$25,438,037.	$25,169,926.	$28,448,605.	$28,406,974.
Operating expenses and taxes per mile of road	$6,137.	$10,980.	$11,974.	$11,932.	$13,486.	$13,177.
Net earnings	$4,139,952.	$8,164,788.	$8,302,822.	$8,582,777.	$9,844,426.	$10,695,328.
Net earnings per mile of road	$1,973.	$3,842	$3,908.	$4,068.	$4,666.	$4,961.
Net earnings per train mile	Cents 20.332	Cents 36.560	Cents 35.612	Cents 36.593	Cents 44.577	Cents 49.651

In the four full years the gross earnings per mile of road increased 24 per cent. and the net 29 per cent.; the gross earnings per mile of road rose from $14,240 to $17,579. The ton-miles per mile of road worked rose from 1,850,000 to 2,320,000, or 25 per cent. This is an extraordinary showing for an old road working in a territory where the conditions of population, industry and trade change but slowly. But the increase in business has been accompanied by a parallel increase in efficiency of operation as shown by the figures of earnings per train-mile and of freight trainload, and by the relative growth of the net earnings. That is, while gross earnings per mile of road gained 24 per cent. in the five years, the net gained 29 per cent. These figures show what the new management succeeds to—a property immensely different from the Erie of only five years ago, and an efficient, modern machine of transportation.

The financial condition of the company also is very different. The bonded debt is close to 176 millions and the interest is $8,295,000, while rentals of leased lines are $1,119,000 more. Yet, after paying 9⅛ millions of fixed charges, the company had a surplus from the year's operations of $2,823,000. This would have paid 4 per cent. on the $63,892,400 (non-cumulative) preference shares and still have left something for the common. In fact, a dividend of 1½ per cent. ($718,000) has been declared on the first preferred since the end of the fiscal year.

But this surplus, available for dividends or for further improvements, remains after the expenditure, out of current revenue, of $1,154,000 for improvements which was charged to the two maintenance items of operating expenses.

In brief, if there are to be new operating and administrative methods in the Erie, as part of the public has assumed, the new management has the advantage of starting with the property in better condition (we suppose) than ever before in its history; it has the disadvantage of being obliged to compare the next few years' results with the fine results that are set forth in this interesting report.

Buffalo, Rochester & Pittsburgh.—This company controls 472 miles of road, with lines from Buffalo and Rochester, through the soft coal fields of Northwestern Pennsylvania to Pittsburgh. It is only since 1900 that connection has been obtained with the latter city, and the present arrangement is in the form of a trackage contract for 41 miles of the Pittsburgh & Western, from Butler, to which point the Buffalo, Rochester & Pittsburgh built in 1899 and 1900, under the name of the Allegheny & Western. This new line, 60 miles long, was operated for only six months in the 1900 fiscal year, but its accounts appear for the whole period in 1901, increasing the average length of road operated from 405 to 472 miles. This fact, of course, affects comparisons of the income account, but even allowing for this fact, the statement of income for the year to June 30 last, as contained in the annual report, now at hand, shows large growth in revenues, especially in net results. The figures are appended for two years:

	1901.	1900.	Increase.
Passenger earnings	$778,506	$547,922	$230,584
Coal earnings	3,125,391	2,748,430	376,961
Merch. earnings	1,318,379	1,087,391	230,988
Total, gross	$5,830,618	$5,012,135	$818,483
Operating expenses	3,277,177	2,888,610	388,566
Net earnings	2,553,442	2,123,525	429,917
Charges	$1,338,004	$1,012,955	$202,486
Improvements	530,134	446,977	83,157
Dividends	480,000	240,000	240,000
	$205,304	$325,976	*$120,672

Earnings are large for the length of road operated, accounted for by the heavy mineral traffic, 69 per cent. of the tonnage being soft coal. Gross receipts per mile last year were $12,353, and in 1900 $12,376, increased mileage thus accounting for the whole of the aggregate gain of $818,500 in gross receipts. In 1899, however, gross receipts were $11,248 per mile, and they had been above $11,000 per mile previously only in 1898, and in 1893, having fallen to $8,392 per mile in 1894. Net earnings per mile show an uninterrupted yearly increase since 1894, when they were but $1,992. In 1901 they had risen to $4,071 per mile, as against $3,888 per mile in the previous year. These increases reflect the prosperity which has been attained in the soft coal trade, with which the company is concerned as transportation agency and mine owner, through a controlled property, the Rochester Coal & Iron Company.

There was an increase in soft coal tonnage of 2,696,000 tons, or over 140 per cent., since 1894. Gains in revenue, at all proportionate to the expansion in tonnage, have only been recorded in the last two years because of falling rates. Average ton-mile rates, which were 5.94 mills in 1892, were but 4.12 mills in 1899. There was an increase in 1900 to 4.66 mills and in 1901 a further gain to 5.46 mills, the highest average ton-mile rate received by the company since 1893. Up to this year average cost per ton-mile has been reduced yearly, and in 1900 was only 2.47 mills, against 3.97 mills in 1892. There was an increase in cost per ton-mile in the last year to 2.80 mills, the highest figure since 1897. Ton-mile profit, however, at 2.66 mills was higher than in any recent year.

In ton-miles there was a decrease of 171 millions or 3¼ per cent. This lessened traffic permitted some re-

*Decrease.

duction in train and car mileage, though not to a material extent, and the average trainload was reduced by 12¾ tons to 406 tons, still a large figure, partly explained by the density of traffic, which, in 1901, was equivalent to 1,850,000 ton-miles per mile of road. In 1895 the freight trainload was only 295 tons, while the freight car load was 20½ tons, as against 25⅛ now, and number of cars per train 26⅔, as against 28¼ in 1901.

Details of last year's expenses show that transportation cost accounts for $245,200, and general expenses for $31,400, out of the total expansion of $388,566 in expenses. Nevertheless, the company's large expenditures for maintenance and improvements are noteworthy. In 1901, $530,134 was specially appropriated for improvements, construction and equipment, $126,000 of this being to pay off car trust bonds. Somewhat smaller amounts were appropriated in previous years, and for two years past no charges have been made against capital account for construction on any of the lines owned, though there have been moderate advances to leased roads, for such charges, charged against their capital account.

NEW PUBLICATIONS.

The Official Proceedings of the Western Railway Club for the Club Year 1900-1901. Chicago: Published by the Club, Rookery Building.

The proceedings of this Club for the club year are now issued in a bound volume, with an index, making the valuable collection of facts and opinion available for actual use. The volume may doubtless be had by addressing the Club, as above. The price of the *Proceedings* for one year is $2. This, of course, is unbound.

Universal Directory of Railway Officials. Published by the Directory Publishing Co., Ltd., London. United States: E. A. Simmons, Sole Representative, 697 Chauncey street, Brooklyn, N. Y. 8 vo., pages 623. Price, $2.50.

The seventh annual (1901) edition of the Universal Directory of Railway Officials has just been issued. This work is now so well known to our readers that there is little comment to make in a review. As usual, it contains a list of the railroads of the entire world, with their mileage, gage, equipment and officials, together with alphabetical indexes to all the roads and officials.

Blue Book of American Shipping, Marine and Naval Directory of the United States. Small quarto, 434 pages. Cleveland: The Marine Review Publishing Company, 1901.

The seventh edition of this Directory is received. It contains lists of shipping, owners and builders, naval architects and marine engineers, admiralty lawyers, steamship lines, ship chandlers, dry docks, marine railways, etc. In fact, "etc." in the last sentence covers a list much too long to be printed here. If one has any business relations whatever with ships he will find in this volume some information that he needs.

Proceedings of the Air Brake Association, 1901.—The proceedings of the eighth annual meeting of the Air Brake Association have just been issued, containing the reports and discussion at the convention held in Chicago last spring. The subjects of reports are: The pressure retaining valve; standard form of questions and answers on the air-brake; terminal test plants; and unconnected hose vs. dummy couplings. This is a book of 267 pages which can be secured from Mr. F. M. Mellis, Secretary, 95 Liberty street, New York. Price: Paper, bound, 50 cents a copy; leather bound, 75 cents.

TRADE CATALOGUES.

Drop Forgings.—Messrs. J. H. Williams & Co., Brooklyn, N. Y., have issued a catalogue of drop forgings. The company makes these in iron, steel, copper, bronze and aluminum, their business having been established 17 years, and this being the tenth edition. We suppose that no other concern makes as great a line of drop forged wrenches, and many other specialties are shown and described in the catalogue.

Brake Shoes.—The American Brake Shoe Co., Chicago, has sent to all mechanical officers reprints of Mr. F. W. Sargent's discussion of the M. C. B. brake-shoe report, which has recently appeared in the *Railroad Gazette*. These reprints are accompanied by a pamphlet showing the kinds of shoes recommended by the American Brake Shoe Co. for different classes of service. Also a letter has been sent out calling attention to the failure of the report to give a description of the material in each shoe and particularly of the metal in the bearing face. Mr. Sargent has undertaken to supply this omission so that the tests may be interpreted in a rational manner. Any one interested in the subject, will be furnished these papers on application to the American Brake Shoe Co.

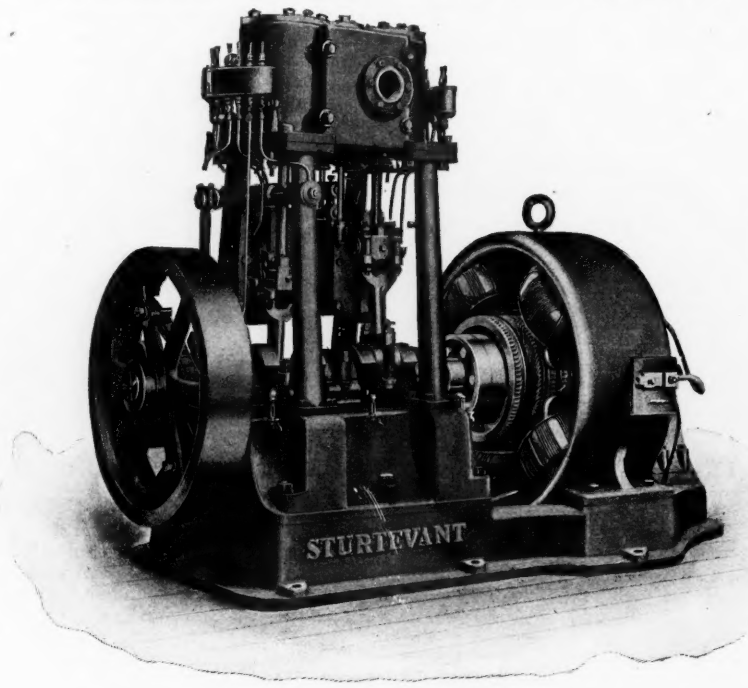
The American Steam Gage & Valve Mfg. Co., Jamaica Plain, Boston, Mass., has issued a catalogue covering the various devices which it makes that are applicable to railroad work. It is standard size, 6 in. x 9 in., has 55 pages, and contains illustrations and descriptions of a number of styles of locomotive gages for steam and air; test gages; whistles; muffled and open-pop safety valves; and the American Thompson improved steam engine indicator. A short history of the gage manufacturing business is given, in which attention is called to the fact that this company has existed for more than 50 years.

A Sturtevant Generating Set.

From the great variety of electric generating sets made by the B. F. Sturtevant Co., one of the latest combinations is here shown. It has a double-cylinder open-type vertical engine and a 4-pole generator mounted on the same bed.

The engine has three main journal bearings, the lower halves of which are brass-bushed and provided with continuous oiling devices. The upright columns carry the single cylinder casting. Two piston valves are operated by a single rocker and yoke. They have snap-rings and removable bushings, and the regulator is of the same general form as that used upon other upright engines. The cross-heads are of the slipper type with projecting cross-head pins; the connecting rods have yoked cross-head ends and are large. Connecting rods and cross heads are of forged steel. The cylinders are thoroughly lagged. These engines are built in sizes 8 in. x 5½ in. and 9 in. x 5½ in., having a rating of 47.5 and 60 h.p. respectively.

The motor is of standard Sturtevant construction with magnet steel frame and the field cores cast on. The bearings are of the ball-and-socket type, ring-oiling and self-aligning. The armature is of the barrel-wound toothed-drum type. Ventilation is by special air ducts between the laminæ of the core. These ducts give a blower action and create a strong draft through the windings. The winding for low-voltage machines is of copper bars, and high-voltage machines are wound with machine-formed coils. The commutator is of drop-forged segments of pure copper secured between cast-iron flanges of spider construction which allow free circulation of air. All machines are fitted with carbon brushes mounted in holders of the sliding socket type. The field coils of double cotton-covered wire are made oil and water-proof, and armatures are similarly treated. All machines are given a full-load test for sufficient time to bring every part to maximum temperature, which never exceeds 40 deg. Cent., and are guaranteed to carry full-rated load for 10 hours without sparking at brushes or overheating.



A Sturtevant Generating Set.

Riding in Sleeping and Dining Cars in England.

[*Correspondence Boston Herald.*]

The "privilege ticket" is a British institution. It takes the place of the trip pass. On the Great Eastern, the Caledonian, the London & South Western and the Southeastern & Chatham, the American form of personal passes is used. But on the London & North Western they issue an order, which you present at the booking office, where you receive in exchange for it a little pasteboard ticket, about 1¼ in. x 1 in.

I had left the London & North Western train at Bletchley in order to change for Cambridge. My guard, whose run ended at Bletchley, had been disappointed in his overtures for a tip en route, and he walked with me on the platform and talked to me about the line in a very respectful and wholly unobtrusive way, but with his eyes always following my hand, on the chance that it might be going after that shilling. The tip, however small, never goes amiss on the English railroad. I gave a porter at Leamington the equivalent of 1 cent, and he touched his cap and said: "Theng-yu-zur," as though it was very welcome.

There is still no comparison in point of comfort between American and English railroads; and most of the comforts which English travelers now enjoy have been brought from the United States. There is, to be sure, one particular in which the American road is inferior to the English. I have never been on an American railroad whose cars rode with the smoothness of the cars on the London & North Western, the Caledonian or the London & Southwestern. On the night trains the number of stops is reduced to the minimum, so that the jolt of starting and stopping does not continually arouse you from your sleep. On the run between London and Glasgow only two stops are made, and the motion of the cars is so steady that you sleep all through the night almost as comfortably as you would in your hotel room. Night traveling is robbed of half its terrors under these conditions.

Sleeping cars are a comparatively novel institution. They are compartment cars. If you want to go from London to Glasgow, you telephone the Euston station and ask them to reserve what berths you need. Two persons of the same sex, or a man and his wife, can occupy a double compartment; for individual travelers there are single compartments.

The clerk at the station tells you that space has been reserved for you. When you reach the station you buy at the booking office a sleeping car ticket, for which you pay 5 shillings. This ticket is good for a berth anywhere on the line, on any train, in any direction.

On the side of your sleeping car hangs a card on which is written opposite the letter representing each compartment the name of the person for whom it has been reserved. Thus it is possible to learn the names of your fellow travelers—if they have given them correctly. The attendant is a white man—there are few negroes in England or on the Continent. He takes you to your compartment and stows your luggage away. Your bed is already made. Then he leaves you, and you do not see him again till morning, unless you have occasion to summon him. In the morning he will serve you a cup of tea, without which no Englishman is able to begin the day.

The bed in your compartment runs at right angles with the window. The mattresses were not as thick as in a Pullman car. There are no curtains to shut out the fresh air, but there are few means of ingress for it. There is a ventilator at the top of the door and another above the window. My compartment was lighted by electricity from the roof. In some cars this light can be shut off by switch keys, easily reached from your berth after you have retired. In others you can cut off the light only by drawing the green cloth curtain around the globe.

In front of the window of your compartment is a washstand with a lid. Raising this lid draws into place on each side dark green curtains, which act as "splashers." You get running water by pressing a metal knob. There is one other convenience under your couch, but the "lavatory," as they call it in England, is at one end of the car, and is reached by the corridor.

The "corridor car," now in general use on all through trains on first-class roads in England, has created a curious democracy. Two, and sometimes three, classes open on the same passage, or corridor, so that the only difference between them is in the quality of upholstering—and the company one finds. The latter consideration is the strongest in determining one to travel first or second class. Second class, by the way, has been merged in first class on many roads.

The corridor in an English or Continental train is a narrow passageway running along one side of the coach. There are vestibules connecting the coaches, so that one may walk from one end of the train to the other, provided that in making up the train they have not put a luggage van in the middle. This is not infrequently the case, and if you have to go through the train the guard or the dining attendant unlocks and opens the doors, and you thread your way between the piles of trunks.

I have thought at times that I liked the English cars, under certain conditions, better than our own. There is always the possibility of having space reserved by a judicious tip to the guard. Secure in your private compartment, with long soft couches on which to lie if you

are tired, the privilege of windows on either side, and a private toilet room in direct communication, you are far more comfortable than you would be in one of Mr. Pullman's plush seats. If you are hungry, you can have a luncheon basket containing a hot or cold meal put aboard, and eat at your leisure and in private.

But given a train crowded to suffocation, uncongenial fellow-travelers, seated all about you (frequently engaged in eating fruit and making a target of the window across your helpless person); confined to one seat, in which you wriggle and writhe as your limbs stiffen under confinement, you long for the American car.

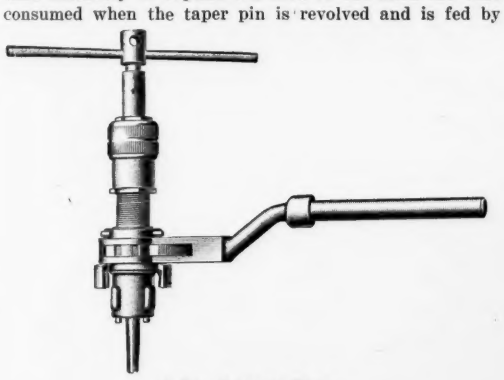
The English dining car is not for one moment to be compared with the American. The meal is not so expensive by some 15 cents, and wines and mineral waters are not sold on it at exaggerated prices; but you have a pretty plain meal. The British idea of eating is limited to "the joint," potatoes and "greens" of some sort and a fruit tart or plain pudding, with cheese. To these may be added a plain soup and a bit of fish. Passengers are permitted to occupy seats in the dining car from the beginning to the end of the journey. The dining car is divided into compartments, some of which are for third class passengers, who pay a smaller price for meals than those traveling first class. It is a fact that on a fast train on which I traveled from London to Liverpool, there were three dining cars and only two first class Liverpool compartments (with a capacity of four passengers each) on the whole train.

Traveling in Ireland, at a time when traffic is heavy, I was obliged to exchange seats with a passenger who was in the dining car when I wanted my dinner. With all the seats occupied and the aisles filled with an assortment of bags, bundles and boxes, the dining car is not a very attractive place.

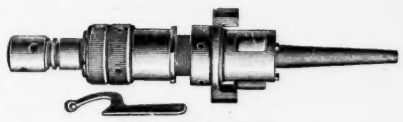
Tube Expanders.

The accompanying illustrations show some of the Atlas and Phoenix tube expanders that are made by The Watson-Stillman Co., New York.

In using the Atlas ratchet type the entire roller case revolves with the ratchet lever. This increases the speed of the expander about three times, and reduces the time necessary to expand the tube to one-third the time consumed when the taper pin is revolved and is fed by

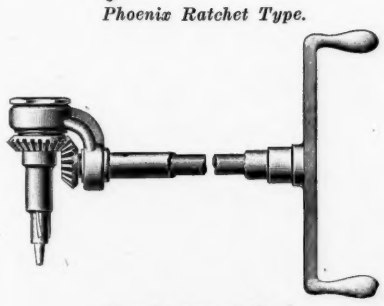


Atlas Ratchet Type.



Atlas Plain Type.

Phoenix Ratchet Type.



Phoenix Geared Type.

Watson-Stillman Tube Expanders.

hammering. Applying the power to the case instead of the taper pin also facilitates rolling imperfect interior tube surfaces, such as lumps or rough welds, and eliminates the jerking motion, so prevalent in the older style expanders, when a lump is found. The taper pin is fed with the screw feed nut shown at the top of the case, thus avoiding all hammering upon the pin and prolonging the life of the tool to a great degree. The rollers are made with the proper taper to bring the surface of the roll parallel with the interior surface of the tube. This insures a good joint throughout the thickness of the head, and expands the tube against the head equally as tight in the rear as in the front of the head sheet. At the bottom of the feed nut a thin hexagon nut acts as a depth gage. Where a number of tubes are to be expanded, with this gage nut the operator can feed the taper pin to the same depth for each tube, thus obtaining uniformity. Changing the adjustment to suit various diameters of tubes is very simple and can be done in less than one minute's time. The scope of this expander is from 2¾ to 3¼ in., thus with one tool combining the entire range of two ordinary tools without changing the rolls or pin.

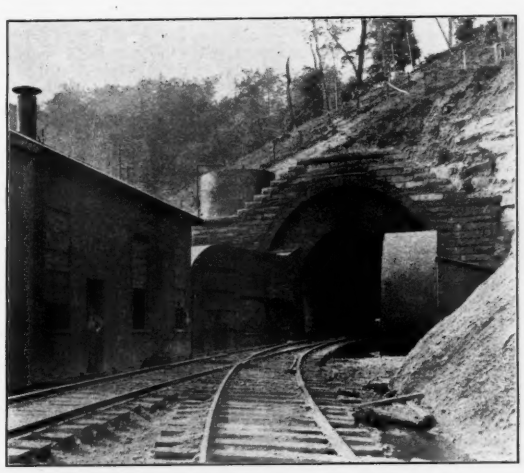
For expanding tubes larger than 3¼ in. diam. slower speed and less proportionate weight of tool is desirable. The plain type Atlas expander is designed to meet these requirements. The ratchet lever is omitted and provision made for revolving the pin instead of the case. Otherwise it is the same as the Atlas ratchet type, but it covers a wider range of work.

The Phoenix ratchet type is made to suit special conditions and limited working space. In power and speed it is similar to the Atlas expander, but its feed mechanism, on account of the contracted working space, is changed from a feed nut to a threaded taper pin. Revolving the roller case with the ratchet lever shown feeds the taper pin through the case with a slow, steady motion. The 1-in. tool can be operated easily in a 27-in. drum, and by making only a partial circumference with the ratchet lever, it can be used in a smaller space.

The Phoenix geared type is for very small working spaces, where the operator is obliged to work outside the shell. The feed and roller mechanism is the same as in the ratchet type, but the roller case in this type is driven by a bevel pinion on the taper pin and a shaft passing through a pipe support. Revolving the case instead of the pin, gives all the advantages of the Atlas expander in relation to speed, and makes this tool four times faster than the regular pin-driven tools.

The Ventilation of the Elkhorn Tunnel.

In our issue of May 10, p. 310, was published a pretty complete description of the Churchill Wentworth ventilating system as installed at the Elkhorn tunnel on the line of the Norfolk & Western. The good report of the performance of this apparatus as published at that time has been confirmed by further experience. We are informed that people on the line, going into the coal field, now regard the trip through the Elkhorn tunnel as the coolest on the road. Car windows are left open and no attention is paid to the fact that the train is passing through a tunnel. Herewith is printed an engraving from a photograph, showing the portal and the installation of fans as completed.



West Portal, Elkhorn Tunnel—Norfolk & Western

Ticket Brokers Win at Buffalo.

The application of the Delaware, Lackawanna & Western for an injunction restraining 61 ticket brokers, doing business in Buffalo, from dealing in special Pan-American tickets over that road has been refused by Judge John R. Hazel, of the United States District Court, and the temporary injunction vacated.

The court holds that the railroad company has the right to make special contracts with individual purchasers of tickets, and that the purchasers cannot violate such contracts by selling their tickets, and it also overrules the point of lack of jurisdiction raised by the defendants' counsel. On the other hand, it denies the application for an injunction because the road is a member of the Trunk Line Association, which combines to fix rates in violation of the law, and, therefore, is not entitled to redress in an equity court.

Judge Hazel says: "It appears that the complainant is a party to a combination which is engaged in pooling railroad rates and in fixing fares for railroad transportation in order to avoid competition between the several lines constituting the association known and distinguished as the Trunk Line Association. It appears that the special Pan-American tickets referred to in the bill of complaint have been issued pursuant to such combination and conspiracy; that the rates and conditions of the tickets were previously arranged and are a product of this combination, organized to stifle competition in railroad rates. It further appears that the complainant and other railroads in the combination are pooling the first and second-class passenger business of their respective roads upon an agreed division of the receipts.

"But can the aid of a Federal tribunal be invoked to protect the complainant in the issuance of a ticket which, as far as it appears to the Court, is the culmination as well as the evidence of an agreement between railroad corporations, specifically forbidden by an act of Congress, which has been sustained by the Supreme Court of the United States? Can the railroad company conspire unlawfully to fix rates, and then come into a court of equity and invoke its aid to protect those rates which are represented by the ticket presented to the Court and which is wrongfully used by the defendants?

"The evil practice which stands admitted by the papers is the very practice in which the Court's protection is invoked. The wrongdoing of complainant, admitted by the papers, is not remote. It has given birth to the combination whose tickets have been wrongfully used by the defendants. This Court has no sympathy with, nor would it lend its aid willingly to, those indulging in practices admitted by the defendants. But, sitting as a court of equity, it is bound by those rules which are the very foundation of that branch of our jurisprudence. The complainant does not come before the Court with clean hands in the transaction complained of. The Court, therefore, cannot grant it equitable relief upon the state of facts before it at this time. The complainant must, therefore, be relegated to its remedies at law, and the injunction vacated."

The Great Eastern Railway, England.

At the half yearly meeting of the Great Eastern Railway, a couple of weeks ago, the Chairman, Lord Hamilton, said a number of things that were rather interesting. We quote a few words from his address:

They were urged by writers in the press to copy the methods of American railroads, but there was no analogy in the conditions of the two countries. For example, British railroads, unlike those of other countries, had been forced to adopt high platforms of a certain length, and they could not increase the length of their trains beyond the length of the platforms.

The Great Eastern directors, being struck with the compound locomotives used on the Northern Railway of France, had decided to have two engines built on this system, but when the order was about to be given it was found that these engines would be too long for the turntables, and it was impossible to alter the turntables at Liverpool street, as they could get no land for this purpose.

During May and June they had put into force at Liverpool street the American check baggage system, but only 63 people had taken advantage of it, and the receipts for the two months were 15s. 9d.

He believed they could make economies in goods traffic, and they had recently obtained a 30-ton truck for trial on their line. But Harwich was almost the only place where they could get 30 tons of goods in one consignment. They had recently built 40 new goods engines, capable of hauling 50 wagons instead of 35, and he believed this would result in economy, though it involved increasing the length of their sidings.

He explained that the workmen's traffic had been remunerative when their suburban lines were not filled up, but the growth of workmen's dwellings on their system had driven out the middle class families, with the result that their trains were running half empty in the middle hours of the day. As things now stood, the workmen's traffic was carried at a loss, and in his opinion this loss should be made up to them in some way by Parliament.

TECHNICAL.

Manufacturing and Business.

The American Steel Foundry Co., St. Louis, Mo., announces it is now making, at Sligo, Mo., its own pig iron and is thus able to put into its steel castings an especially high grade material. The pig iron is made with hardwood charcoal.

H. G. Cummins, who has been chief clerk in the traffic department of the Schwarzschild & Sulzberger Packing Co. and Cold Blast Transportation Co. for several years, has been appointed manager of the National Brass Mfg. Co., of Kansas City, Mo.

Mr. W. H. Bryan, St. Louis, Mo., with offices in the Lincoln Trust Building, has been retained as consulting engineer by the Shickle, Harrison & Howard Iron Co., of that city. Mr. Bryan is a graduate of the Washington University and is well known among electrical and mechanical engineers.

The Phoenix Bridge Co. announces that Mr. Oscar J. West has been made resident engineer of the company at Chicago, with office at 455, The Rookery. Mr. West was formerly in charge of the Boston office of the company. He now takes the place of Mr. A. C. Stites, who retires after long and valuable service.

Mr. W. E. Jeannot, who recently resigned as General Superintendent and Superintendent of Telegraph of the Marinette, Tomahawk & Western, has opened an office at 917-918 Pioneer Press Building, St. Paul, Minn., and will handle second-hand and new railroad equipment and second-hand and new electrical machinery.

Richard S. Mercer, at present with Manning, Maxwell & Moore, has accepted the eastern agency of the Lappin Brake Shoe Co., and will be associated with Mr. Nat P. Hobart, at 39 Cortlandt street, New York City. Mr. Mercer is well known to our readers, having been connected with the Pennsylvania R. R., and later with the Thornton N. Motley Co. He will occupy his new position Sept. 1.

The Barber truck has been specified for the following cars: One thousand box cars for the Chicago, Milwaukee & St. Paul, now building at the company's shops; 1,000 coal cars, recently ordered by the Erie from the Pressed Steel Car Co., and 1,000 box cars, just ordered by the Delaware, Lackawanna & Western from the American Car & Foundry Co., and the 100 cars of the same kind ordered from the Erie Car Works; and on 10 locomotive tenders recently ordered by the Baltimore & Ohio from the American Locomotive Co.

Iron and Steel.

The Conemaugh and Cambria steel companies have been consolidated under the name of the Cambria, with a capital stock of $50,000,000, which is an increase of $5,000,000 over the present joint capital of the two companies.

The Schönthal Iron & Steel Co., lessee of the Cumberland Rolling Mills at Cumberland, Md., is to double the capacity of its plant by putting in order the 12-in. mill. It is said that two new heating furnaces, twice the size of the old one, will be built and the old one repaired at a cost of $10,000. The lease is to be extended until May, 1906.

It is said that a new independent iron and tin plate mill is to be built at Clarksburg, W. Va., by the Jackson Iron & Tin Plate Co., which was recently incorporated under the laws of West Virginia, with a capital stock of $300,000. Contracts have been awarded for $250,000 worth of machinery and the erection of several buildings has begun. The plant is to contain 14 mills and employ 500 men.

Williams' Lanterns for Color Blind Testing.

The lantern designed by Dr. Charles H. Williams, of Boston, for testing the color sense of railroad men's eyes, and which has been in use on the New York, New Haven & Hartford for several years, has recently been put in use on the Philadelphia & Reading, the New York, Ontario & Western and the Great Northern. It has also been ordered for use at the Grand Central Station, New York.

Preservation of Timber.

The July issue of the *Bulletin of the International Railway Congress* contains the report on the question of the Preservation of Timber, Subject VIII., for discussion at the sixth session of the Congress. The report was made by Mr. Herzenstein, a Russian engineer of scholarship and distinction, who has reported on the same subject in former years. This report is very comprehensive and in thoroughness of investivation of existing practice among the different railroads of the world it is the most complete document that has yet been produced. More or less detailed information was received from 87 different managements and the reports made by Mr. Herzenstein for the fourth and fifth congress have been massed and incorporated with the report now presented. We shall attempt no summary of the information collected which, indeed, is unnecessary, for the most important data have already been summarized by Mr. Chanute and have been brought to the attention of our readers. We mention this valuable report simply to enable those who want to study the subject to procure it. This copy of the *Bulletin* may be had from Mr. Paul Weissenburch, 49 rue du Poincon, Brussels, Belgium, the price of it being $1, which may be remitted by international money order.

Transfer of the Bethlehem Steel Co.

The Bethlehem Steel Company, which also includes the Bethlehem Iron Company, on the 27th passed into the hands of Charles M. Schwab. A check for $4,032,000 was deposited with the Girard Trust Company, by Drexel & Co., in payment of 168,000 shares of the Bethlehem steel stock. The total number of shares in the company is 300,000. Immediately after the receipt of the check a new Board of Directors and new officers were elected. The new board is as follows: R. P. Linderman, E. T. Stotesbury, E. M. McIlvaine, Archibald Johnston, George F. Baer, J. P. Ord, Charles McVeagh. The officers are: E. M. McIlvaine, President; A. N. Borie, Vice-President; H. S. Snyder, Secretary; A. N. Claver, Treasurer; Archibald Johnston, General Superintendent. All of the directors are new with the exception of Mr. Linderman and Mr Stotesbury, who served on the old board. George F. Baer is President of the Philadelphia & Reading. E. T. Stotesbury is a member of the firm of Drexel & Co. Messrs. Linderman, McIlvaine and Johnston were connected with the old Bethlehem Steel Company, the former as President. President McIlvaine declined to state whether Mr. Schwab had purchased the stock for himself or for other persons. He said that the company would remain independent.

THE SCRAP HEAP.

Booming Fuel Oil in California.

The *Los Angeles Herald* gives the following approximation of the visible and probable demand and supply for petroleum as fuel in the Southwest and on the "Slope":

Petroleum Consumption a Year Hence.

	Barrels.
Southern Pacific Railroad	5,884,200
Santa Fe Railroad	1,260,000
Salt Lake, Pacific Coast and Northern Pacific Coast railroads	126,000
Refineries in state	2,000,000
Factories, pumping plants, street railways, etc., Southern California	1,000,000
Three San Francisco street railways now installing oil fuel	.....
Two San Francisco ship yards and iron works now installing oil fuel	.....
San Francisco ferries now installing oil fuel	.....
One hundred other San Francisco consumers of fuel, now using or preparing to use oil	.....
Four great ocean steamers now building, with oil burners	.....
Fifteen Sacramento River steamers being equipped for oil	.....
Manufactories in other coast cities	.....
Mines throughout the Southwest	.....
Increased use of fuel gas made from petroleum	.....
Consumption that can be estimated	10,270,200
Probable consumption	15,000,000

Present Outlook for Next Year's Production.

Coalinga	750,000
Kern River	5,000,000
McKittrick	500,000
Midway	250,000
Sunset	500,000
Santa Barbara County	100,000
Ventura County	750,000
Los Angeles County	2,100,000
Orange County	400,000
Prospective production a year hence	10,350,000

The Harbor of Emden.

Within a few weeks the harbor of Emden will be formally opened. Nearly $2,000,000 have been expended during the past year in dredging and constructing new docks. It is the intention of the Government to place Emden, in time, on an equality with Cuxhaven and Bremerhaven. The general situation of the harbor is favorable to ocean traffic, and the improvements will bring the town of Emden to the edge of the deep water of the River Ems, a position which it occupied in former centuries. The anticipated increase in commerce will tend to develop traffic on the Dortmund-Ems Canal and the railroads terminating in Emden, where the Hamburg-American Line and Westphalian Transport Company have already rented larger depots.

Changing Station Names.

There has been considerable doing along the Hudson River Railroad of late, in the way of changing names of stations. The most notable change was the one from Sing Sing to Ossining; and it is estimated that from 10 to 20 passengers are carried by the station now every day. The station so well known as Low Point is still remembered by scores of passengers as Low Point. It was named Carthage Landing, but the public simply would not have it, and now the company has changed again, and the place is called Chelsea. The station on the West Shore road, so long known as Cranstons, is now known as Highland Falls, and passengers are frequently carried by it on that account. . . . Some one has noted that when the company changes the name of a station it at once proceeds to make improvements in the place. If this be the invariable rule, what is the matter with changing the name of the Poughkeepsie station to any name under the sun, provided it will result in a new station?—*Poughkeepsie Press.*

A Ducal Excursion.

The Duke of Marlborough recently held a reception at Blenheim Palace, which appears to have been looked upon as a considerable novelty in that part of the world. The 194 guests came from Yorkshire and the Midlands and were provided with an important share of their entertainment—that is to say, the two principal meals—on the special train by which they were carried to and from Blenheim. A contract was made with the Great Central Railway for a single train of corridor dining cars to carry the whole party. Following the English fashion, the passengers were carried in the dining cars all of the way. Sixty-eight of the guests were carried in first-class dining cars and 126 in third-class, though whether or not there was a difference in social standing, such as would be indicated by these figures, is a point which is not touched upon in the account of the excursion which we find in the *Railway News*. The train was made up of nine corridor dining cars, which, with the engine, extended a length of about 510 ft.; and the total weight was 270 tons. The train left Bradford at 7:10 a. m. and arrived at Blenheim at 11:40; on the return it started at 5:50 and reached Bradford at 10:15. The breakfast (on the going trip) consisted of fish, bacon, eggs, lamb chops, cold tongue, marmalade, etc.; and for dinner (on the return) the bill of fare consisted of soup, fish, roast lamb, roast chicken, salad, sweets, cheese, dessert and coffee. This was for the first class passengers; those in the third class were supplied with "an excellent breakfast and dinner selected from these dishes."

Public Work at Washington.

We noted recently (Aug. 2, p. 551) the letting of the contract for machinery for a new sewage pumping station at Washington, to the Allis-Chalmers Co. This machinery will be used in the new sewage disposal station. All the sewage of the city except storm water will be carried to this station by gravity and pumped into an inverted syphon and taken through a tunnel across the Anacostia River, where it will be again discharged into a gravity sewer. The building for the pumping station will be one-story high in the main part, and plans are at present being prepared for the foundations, for which extensive piling will be necessary. The plans are also being prepared for the syphon tunnel across the Anacostia River and for the sewer to Magazine Point, and bids for these tunnels will probably be called for within a very few weeks. Congress has authorized an expenditure of $750,000, of which $375,000 has been appropriated, and from which $253,000 will be spent for the machinery already ordered. The estimated cost of the station is $835,000, exclusive of the tunnels above mentioned.

Concessions for Railroads in Nicaragua.

The Nicaraguan Government has granted a concession to Mr. H. C. Emery, of Chelsea, Mass., for a road from Matagalpa to the head of navigation, on the Grande River, 100 miles. By the terms of the concession, Mr. Emery is to have 12 months after Congress has ratified the concession in which to organize a company, and 18 months to make surveys. The time allowed to build the road is five years. In return for his services Mr. Emery is granted certain rights and exemptions for colonists brought into Nicaragua for the next 25 years, and he will also receive public lands along the line of the road, in alternate lots for four miles, the grant to extend half a mile on each side of the road. Besides this, navigation rights on the Grande River and on the Atlantic coast are granted.

New Record for Iron Ore.

The steamer "Sir William Edenborn" entered Conneaut Harbor, the Carnegie port, with 7,380 tons of iron ore, on Aug. 26. This breaks, by 58 tons, the previous cargo record on the Great Lakes, which was held by the steamer "Isaac L. Ellwood."

National Bureau of Standards.

A meeting of the Board of Visitors of the National Bureau of Standards was held at Washington, on Aug. 23, to consider the several available sites which had been offered for the Bureau, and to choose the best location. The site selected is in the northwestern suburbs of Washington, fronting 650 ft. on the Pierce's Mill road, near Connecticut avenue extended, and within 20 minutes ride of the Treasury Department. The site, which is on high land overlooking the city, contains about eight acres and cost $25,000, and it is one of the finest locations in Washington for this purpose, being far enough from the electric car line to avoid interference with the instruments or apparatus. The plans for the buildings are now being prepared in the office of the Supervising Architect. Prof. Stratton, Director, and others connected with the Bureau, have made several trips in this country and in Europe to inspect laboratories from which useful suggestions for the laboratory might be gained. While the buildings for the Bureau are under construction its offices will be in the Coast Survey Building, where much important work will be carried out.

The Allis Engines in Glasgow.

Consul Taylor, of Glasgow, July 26, 1901, writes in regard to recent newspaper attacks on the American engines used by the Glasgow tramways. It is asserted that the engines, at the opening of the exposition, were incapable of running; that later, when tried with a light load, they broke down through the bearings becoming overheated, and that they were generally unsatisfactory. These assertions were never warranted by complaints from those who had supervision of the tramways. Not only have the American engines fulfilled, but they have exceeded, expectations. The little trouble at first experienced from warm pins with the Allis engines has entirely disappeared. As regards the Musgrave engines there have been some incipient troubles from heating, but not more than might reasonably be expected in starting a new engine. Of course, to well-informed engineers, on both sides of the water, such stories about Allis engines are absurd.

The Taunton Ship Canal.

The engineers who are making a preliminary survey of the route of this proposed canal, for the Harbor and Land Commissioners, under recent legislative enactment, have run a base line from Brockton to Boston Harbor and have nearly completed the base line from Brockton to Taunton, Mass. It is thought that the field work will soon be completed.

A Bridge Over the Oxus.

It is said that the old wooden boat bridge over the Amu Daria (Ancient Oxus) on the line of the Trans-Caspian Railroad, will be replaced by an iron bridge 5,000 ft. long, supported on 24 piers. It is estimated that the total weight of the structure will be about 5,190 tons, and the cost $2,600,000.

LOCOMOTIVE BUILDING.

The Texas Central is having two engines built by the Baldwin Locomotive Works.

W. S. Hall, representing the Copper Belt Railroad, Salt Lake City, Utah, is asking bids on one mogul locomotive.

The Chicago, Rock Island & Pacific order with the American Locomotive Co., as stated last week, calls for 12 10-wheel passenger and 17 10-wheel freight engines and one Chautauqua type engine, to be built at Dunkirk. The passenger engines will weigh 176,000 lbs., with 134,000 lbs. on the driving wheels and have 20-in. x 28-in. cylinders; 68¾-in. driving wheels; radial stay boilers with a working steam pressure of 200 lbs., and 320 tubes 2 in. in diam. and 15 ft. long; fire-boxes 119 in. long and 41½ in. wide; tender capacity, 5,500 gals. of water and 10 tons of coal. The freight engines will weigh 174,000 lbs., with 132,000 lbs. on the driving wheels and have 20-in. x 28-in. cylinders; 64¾-in. driving wheels; wagon top boilers, with a working steam pressure of 200 lbs., and 330 tubes 2 in. in diam. and 15 ft. long; fire-boxes, 119 in. long and 41½ in. wide; tender capacity, 5,500 gals. of water and 10 tons of coal. The specifications for all the locomotives include Westinghouse brakes, Gollmar bell ringers, Janney couplers, Simplex injectors, Jerome packings, Leach sanding devices, Nathan lubricators, American Steel Casting Co.'s wheel centers and Scott springs.

CAR BUILDING.

The Pennsylvania has ordered one private car from the Pullman Co.

The Northern Lumber Co. has ordered 20 freight cars from the Russel Wheel & Foundry Co.

The Burlington, Cedar Rapids & Northern has ordered three 60-ft. mail cars from the Pullman Co.

The Chicago, Rock Island & Pacific has ordered four composite and 100 furniture cars from the Pullman Co.

The Guayaquil & Quito has ordered 15 cars from the American Car & Foundry Co., to be built at Wilmington.

The Central Land Co. has ordered 16 cars from the American Car & Foundry Co. They will be built at Milton.

The Midland Linseed Oil Co., Minneapolis, Minn., has ordered four tank cars of 7,000 gals. capacity from the Erie Car Works.

Steinhardt & Co., New Orleans, La., have ordered from the Erie Car Works 12 tank cars of 7,000 gals. capacity. They are intended for the Columbia Refining & Mfg. Co.

The Cleveland, Cincinnati, Chicago & St. Louis will build 100 flat cars of 80,000 lbs. capacity and 100 box cars of 60,000 lbs. capacity in its own shops, instead of 100 coal cars as reported in our issue of Aug. 23.

The Delaware & Hudson, notwithstanding official denials, has under consideration the ordering of 1,000 freight cars. Whether or not these will be ordered will be determined upon the return early next month of one of the officials of the company who is at present in Europe.

The Metropolitan Express Co., of New York City, which operates suburban express service over the lines of the Metropolitan Street Railway Co., is in the market for 25 express cars. They will be equipped with the overhead trolley, underground electric and storage battery systems.

BRIDGE BUILDING.

FORT DODGE, IOWA.—A steel bridge, 2,650 ft. long, is to be built over the Des Moines River, the Minneapolis & St. Louis and the Illinois Central tracks and several streets, for the Mason City & Fort Dodge, acting for the Chicago Great Western. The bridge is to be of the viaduct type, with towers and intermediate spans. H. C. Keith, Bridge Eng., M. C. & Ft. D. (Aug. 9, p. 566.)

CAMDEN, MICH.—We are told that the crossing of the Lake Shore & Michigan Southern by the Camden Southern is ordered made by means of an overhead bridge at least 22 ft. above the tracks crossed.

VIOLA, MERCER COUNTY, ILL.—The Town Clerk will receive bids, at 10 a. m., Sept. 2, for a steel bridge 54 ft. long over a small creek near Viola. Further particulars may be obtained from J. Ashenhurst, Town Clerk.

CAMBRIDGE, OHIO.—The County Commissioners will receive bids, until Sept. 3, for an iron and steel bridge. Apply to W. P. DeHart, Clerk of the Board.

SIX FORD, YORK TOWNSHIP, OHIO.—The Hocking Valley R. R. will build a bridge at Six Ford, for the stone work of which bids were called Aug. 23.

ANDOVER, N. B.—The Chief Engineer of the Provincial Department of Public Works at Fredericton, N. B., is now receiving tenders for building the steel superstructure of the Andover highway bridge across the St. John River between Andover and Perth, in Victoria county. (Aug. 23, p. 594.)

TORONTO, ONT.—A motion has been introduced in the City Council for building the proposed bridge across the Esplanade at the foot of Yonge street. (Construction Supplement, March 8, 1901.)

ANGUS, QUE.—Tenders will be called for in a few days for the erection of an iron bridge.

HOPEDALE, MASS.—We are told that the contract for the steel trestle work over the tracks of the Grafton & Upton has been let to the American Bridge Co. (July 19, p. 522.)

ALBANY, N. Y.—It is said that the New York Central & Hudson River will build a new bridge in place of the Livingstone avenue bridge across the Hudson River. It is to be exactly like the Maiden Lane passenger bridge. The span, when completed, will be 1,250 ft., including 400 ft. draw. The superstructure will be built by the American Bridge Co., and the substructure by the railroad.

CLEVELAND, OHIO.—Sealed proposals will be received at the office of the Clerk of the Board of Control, until noon, Sept. 4, for repairing with concrete and masonry the substructure of the bridge over the Cleveland Terminal & Valley R. R., connecting Stone's Levee and Canal street. Plans can be obtained after Aug. 26, at the office of the Chief Engineer. Chas. P. Salen, Director of Public Works.

RALSTON, OKLA. T.—The Commissioners of Pawnee County will receive bids, on Aug. 21, for a steel bridge 1,026 ft. long over the Arkansas River. Another bridge is also to be built 15 miles below over the same river, and bids will be opened at the same time. W. F. McTague, Clerk, Ralston, Okla. T.

ZANESVILLE, OHIO.—Bids are wanted, Sept. 9, for the superstructure of the draw span at the easterly end of the new Y bridge at Zanesville. J. L. Starkey, County Auditor. (July 19, p. 523.)

SPRINGFIELD, OHIO.—Plans, specifications and bids are wanted, Sept. 7, for an iron or steel bridge across Mad River, on the Dayton & Mad River Valley turnpike. A. K. Hahn, County Auditor.

PARIS, TEXAS.—The Commissioners have let the contract for a steel truss bridge on the Arthur City & Chicota road, over Sanders Creek, to the George E. King Bridge Co., of Des Moines, Iowa. The bridge is nearly 300 ft. long and the center span, 63 ft., will be of steel.

LANCASTER, PA.—Sealed proposals will be received at the office of the Commissioners of Lancaster County until noon, Sept. 12, for the repairing of the iron intercounty bridge over Conewaygo Creek between Lancaster and Dauphin counties, Pa. Further details can be obtained from the County Commissioners' office. D. E. Mayer, Commissioner.

PASSAIC, N. J.—Sealed proposals are invited by the Freeholders of the counties of Passaic and Bergen, on Aug. 31, at 2 p. m., for a stone and brick arch bridge across the Passaic River. Bids will be received at the house of Christian Huber, 42 Lexington avenue, Passaic. (Aug. 23, p. 595.)

ST. PAUL, MINN.—It is said that plans have been completed for a new bridge over the tracks of the Chicago, St. Paul, Minneapolis & Omaha, where they cross the White Bear road. The bridge will be 165 ft. long, with approaches which will make the entire structure 820 ft. The approximate cost will be $16,000. G. O. Edmonston, City Bridge Department.

ST. JOSEPH, MICH.—It is said that the Chief Engineer of the Pere Marquette will recommend a new steel bridge across the St. Joseph River, with a swing of 150 ft., and approaches with stone supports 600 ft. long. The estimated cost is $200,000.

LESTERSHIRE, N. Y.—It is said that the Lackawanna will soon award the contract for a new bridge or viaduct of iron on Main street, near the Roberson Planing Mill. The estimated cost is $13,000. (Construction Supplement, March 8, 1901.)

PORT ROYAL, TENN.—The County of Montgomery agrees to furnish $3,000 for a bridge across the Red River, if the contractor will trust to tolls for the remaining $5,000.

RICHMOND, VA.—The Virginia Union University and other property holders propose to build a $5,000 bridge over Bacon's Quarter Branch, on Lombardy street.

COATESVILLE, PA.—It is said that the Pennsylvania Company's bridge over the Brandywine will be rebuilt to take two more tracks.

PITTSBURGH, PA.—An effort will be made to have a new contract placed for a steel bridge at South Tenth street.

Other Structures.

BROOKLYN, N. Y.—It is said that the Rapid Transit Co. will build a $100,000 steel car shed at East Forty-fifth street and Avenue M.

EVANSVILLE, IND.—The Louisville & Nashville is said to have bought considerable property near the old depot and intends to start work on the new structure at once. It is said that the new depot will cost $250,000.

GREAT FALLS, MONT.—Bids have been opened at St. Paul, Minn., and Great Falls, for a $20,000 freight house for the Montana Central at Great Falls.

HOUSTON, TEXAS.—It is said that the International & Great Northern has begun preparations for the erection of a modern depot building at this place. (July 5, p. 490.)

KANSAS CITY, MO.—An offer of $500,000 bonus has been made by the Fourth Ward Improvement Association, if the Union Depot Co. will build a new union depot in or near the Fourth Ward.

LANSING, MICH.—Plans have been adopted by the Michigan Central for a new depot which it is thought will be used jointly by this company and the Pere Marquette. The plans provide for a one-story brick building, 160 x 60 ft., and it is said that bids will be opened within a few days.

NAMPA, IDAHO.—It is said that a new depot to cost about $12,000 will be built for the Oregon Short Line this fall.

NAPOLEON, OHIO.—This town has given the Detroit Southern 28 acres of land, and it is said the railroad shops are to be removed here from Lima, Ohio.

NEWARK, N. J.—The Ingersoll-Sergeant Drill Works, now located at Easton, Pa., are said to be seeking a situation in Newark for a factory site, with the intention of removing their entire plant there.

POCATELLO, IDAHO.—An officer of the Oregon Short Line writes that plans are being made for shops at this place, but nothing has yet been decided upon.

RUTHERFORD, PA.—It is said that the Philadelphia & Reading has awarded a contract to George W. Beard & Co., of Reading, for extensive improvements to be made at the Rutherford freight yards, including engine house, machine shop and turn-table.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xvii.)

Association of Railway Superintendents of Bridges and Buildings.

The Eleventh Annual Convention of this Association is to be held at the Kimball House, Atlanta, Ga., Oct. 15 to 17. After the close of the session a very enjoyable trip to Miami, Fla., has been arranged for by the entertainment committee. A cordial invitation is extended to all railroad officials interested in the aims and purposes of the Association, to attend the sessions of the convention.

SUBJECTS FOR REPORT AND DISCUSSION.

1. Methods of sinking foundations for bridge piers in depth of water 20 ft. and under—G. W. Andrews, B. & O. R. R., Baltimore, Md., Chairman.
2. Passenger platforms at way stations; best material and cost—J. B. Sheldon, N. Y., N. H. & H. R. R., Woonsocket, R. I., Chairman.
3. Slips for ferry boats used for transferring cars—John D. Isaacs, Southern Pacific Railway, San Francisco, Cal., Chairman.
4. Best method of operating turn-tables by power—F. E. Schall, L. V. R. R., South Bethlehem, Pa., Chairman.
5. Auxiliary coaling stations; best design, capacity and method of handling coal—W. A. McGonagle, D. & I. R. R. Co., Two Harbors, Minn., Chairman.
6. Water stations: best material for foundations, tanks, substructure, connections, capacity, etc.—A. S. Markley, C. & E. I. Ry., Danville, Ill., Chairman.
7. Is it best for railroad companies to erect their own steel structures, or let the manufacturers erect them?—O. J. Travis, Illinois Central R. R., Chicago, Ill., Chairman.
8. The best and most convenient outfit cars for bridge gangs, and number of men constituting a bridge gang—A. W. Merrick, C. & N. W. Ry., Huron, S. D., Chairman.

SUBJECTS TO BE DISCUSSED.

Necessary and kind of tools for the equipment of a gang of bridge men.
Best snow fence—stationary or portable.
Best method of erecting track scales, suspended or under track.
Is concrete a suitable and economical material for bridge piers and abutments and culverts and arches?
Hand vs. air riveting; power used.
Most practical and cheapest bumper for yard terminals.
Are tie plates on bridge ties a benefit or a detriment?

PERSONAL.

(For other personal mention see Elections and Appointments.)

—Mr. F. H. Nourse, for a number of years Superintendent of the Salem & Lowell (Boston & Maine), died Aug. 17, at Winchester, aged 82 years.

—Mr. George T. Ross, General Superintendent of the Montana Central, is 35 years old, having been born in 1866 at Truro, N. S. His first railroad service was in 1884 as an agent on the Intercolonial. He then passed through various positions, such as operator, roadmaster's clerk, trainmaster, Assistant Superintendent, and in October, 1899, was made Assistant General Superintendent of the Montana Central.

—Mr. Thomas B. Burnett, at one time Vice-President and General Manager of the Los Angeles Terminal (San Pedro, Los Angeles & Salt Lake), died at Los Angeles, Cal., Aug. 15. He was born in Wisconsin in 1845 and entered railroad service in 1862 as a clerk on the Milwaukee & Prairie du Chien. In 1881 he was made Division Superintendent of the Wabash, St. Louis & Pacific, and in December of the same year became General Superintendent of the Peoria & Pekin Union. This position he held for nine years, becoming Vice-President and General Manager of the Los Angeles Terminal in 1890, ill health compelling him to resign from the last-named position about five years ago.

—Mr. Charles Selden, Superintendent of Telegraph of the Baltimore & Ohio, whose jurisdiction was, on July 1 of this year, extended over the entire system, with a wire mileage of 35,000 miles, was born in Cincinnati, Ohio, Jan. 8, 1849. At 12 years of age he was messenger boy for the Morris & Stebbins Telegraph Company, at Leavenworth, Kan., and at 17 acted as train despatcher in Indiana. He went to the Western Union in 1868 and remained eight years with that company. In 1880 Mr. Selden became Superintendent of the American Union Telegraph Company, and after the consolidation of this company with the Western Union he went to the Wabash as Superintendent of Telegraph. Four years later he entered the service of the Baltimore & Ohio as Superintendent of Telegraph, including both railroad and commercial lines.

—Mr. B. A. Worthington, Superintendent of the Tucson Division of the Southern Pacific Company, was born in Sacramento, Cal., Nov. 20, 1861. He began his railroad career as a messenger on the Central Pacific and leased lines in 1874, afterwards becoming telegraph operator. In 1881 he was appointed Secretary to the late Mr. A. J. Stevens, who was then General Master Mechanic of the Central Pacific. Upon the death of Mr. Stevens, Mr. Worthington became Private Secretary to the Vice-President and General Manager of the Southern Pacific, remaining there until 1895, when he became Mr. H. E. Huntington's Private Secretary. Three years later he was put in charge of tonnage rating of locomotives on the Pacific System of the Southern Pacific and assumed his new duties, those of Division Superintendent, on Aug. 1 last.

ELECTIONS AND APPOINTMENTS.

Baltimore & Ohio.—E. P. Mobley, heretofore Division Engineer at Cumberland, Md., has been appointed Division Engineer, with headquarters at Baltimore, Md., succeeding J. F. Cassell, resigned. Mr. Mobley, in turn, is succeeded by A. W. Thompson, heretofore Assistant Engineer at Pittsburgh, Pa. We are informed that there is no foundation for the reports that Oscar G. Murray, First Vice-President, has become Traffic Director of this company, or any other company.

Central of Georgia.—E. H. Hinton, Traffic Manager, with headquarters at Savannah, Ga., has resigned, effective Oct. 1. W. A. Winburn, heretofore General Freight Agent, will succeed Mr. Hinton.

Chicago & North Western.—Lester S. Carroll has been appointed Purchasing Agent of this company and the Fremont, Elkhorn & Missouri Valley, with headquarters at Chicago, succeeding Charles Hayward, resigned, effective Sept. 1.

Chicago, St. Paul, Minneapolis & Omaha.—L. T. Jamme has been appointed Assistant General Freight Agent.

Detroit Southern.—Frank B. Betz has been appointed Engineer Maintenance of Way, with headquarters at Springfield, Ohio.

Elgin, Joliet & Eastern.—J. F. Cassell, heretofore Division Engineer of the Baltimore & Ohio, has been appointed Chief Engineer of the E., J. & E.

Evansville & Terre Haute.—George H. Bussing has been appointed Master Car Builder, with headquarters at Evansville, Ind.

Fort Worth & Rio Grande.—R. H. Hillyard has been appointed Acting Superintendent of Bridges and Buildings.

Fremont, Elkhorn & Missouri Valley.—See Chicago & North Western.

Grand Trunk.—A. A. Maver has been appointed Master Mechanic, succeeding J. E. Muhlfeld, resigned to accept service with another company. T. A. Summerskill has been appointed Master Mechanic, of the Northern Division, with headquarters at Allandale, Ont., succeeding W. Ball, resigned, effective Aug. 26.

Great Northern.—C. F. Sewell has been appointed Assistant Superintendent of the Willmar Division and the Willmar & Sioux Falls, with headquarters at Willmar, Minn. W. H. Hill succeeds Mr. Sewell as Assistant Superintendent of the Dakota Division, with headquarters at Larimore, N. Dak., effective Aug. 25.

Gulf, Colorado & Santa Fe.—P. T. Dunlop has been appointed Division Master Mechanic, with headquarters at Temple, Texas, succeeding J. W. Kelly, resigned.

Louisville & Nashville.—E. E. Snyder has been appointed Superintendent of the Memphis Line, Clarksville & Princeton and Clarksville Mineral branches, succeeding L. S. Robertson, resigned. J. R. Wheeler succeeds Mr. Snyder as Superintendent of the Owensboro & Nashville Division.

Mexican Central.—D. F. Busher has been appointed Superintendent of the Chihuahua Division, succeeding G. J. Hartman, resigned.

Oregon R. R. & Navigation.—R. B. Miller, Assistant General Freight Agent, has resigned.

Seaboard Air Line.—R. P. C. Sanderson has been appointed General Purchasing Agent, succeeding E. Belknap, resigned to engage in private business, effective Aug. 20. Cecil Gabbett, Superintendent of the Fourth Division, has resigned.

The Pullman Co.—E. A. Benson, heretofore Manager of the East Buffalo shops, has been appointed Mechanical Superintendent, with headquarters at Chicago, Ill.

Union Pacific.—Charles Clifford has been appointed General Agent of the Freight Department, with headquarters at No. 3 Montgomery street, San Francisco, Cal., succeeding Thos. M. Schumacher, resigned, effective Sept. 1.

Union Pacific.—Henry G. Kaill has been appointed Assistant General Freight and Passenger Agent, with

headquarters at Kansas City, Mo., effective Sept. 1. Horace I. Bettis has been appointed Assistant General Auditor, with headquarters at Omaha, Nebraska.

Washington County.—The position of Roadmaster has been abolished and that of Superintendent substituted. P. H. Baker becomes the new Superintendent.

Weatherford, Mineral Wells & Northwestern.—George E. Littlefair has been appointed General Freight and Passenger Agent, with headquarters at Weatherford, Texas.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

Atchison, Topeka & Santa Fe.—This company has acquired possession of the Santa Fe & Grand Canyon, which extends from Williams, on the line of the Santa Fe Pacific in Arizona, about 63 miles north to a point within 12 miles of the Grand Canyon of the Colorado. It is said that it will be extended at once to the Canyon.

Baltimore & Ohio.—It is said that contracts have been awarded for a new coal road in Quemahoning County, Pa. Work will begin at once and the new line will probably be in operation by the first part of next year. It will extend from Freiden, on the Somerset & Cambria Branch, to Jenner, 15 miles, and will be known as the Quemahoning R. R.

Barberton, Akron & Eastern.—This company has been incorporated in Ohio with a capital stock of $25,000 to build a steam railroad from Barberton, via Akron to some point on the Ohio-Pennsylvania lines in Mahoning county, a distance of about 75 miles east. The incorporators are: C. D. Crouch, L. C. Miles, H. H. Gibbs, E. H. Gibbs, Elmer Turner, B. W. Robinson, H. B. Manton, and M. M. Pope, of Columbus.

Boulder & Inter-Mountain.—It is said that the contract for grading 23 miles of this new line, which is to run from Superior, Colo., 26 miles west to Eldora, has been let to J. R. De Reemer.

Canadian Pacific.—The contract for the seven-mile cut-off at Field, B. C., has been let to J. Stewart, of Nelson, B. C. The work is very heavy and it is expected that it will cost $100,000 per mile, but it will eventually effect a great saving in operating and in time.

Cape Breton Ry. Extension.—Work was reported begun on this new line, on Aug. 22, at Point Tupper, N. S. (Aug. 16, p. 582.)

Chicago & North Western.—An officer writes that building is in progress on the Minnesota Western Branch, from Marshall, Minn., southwest 46 miles, passing from Wabasso to Evan, Minn. The contracts have been let to Winston Bros., of Minneapolis, and the work is reported well under way. The maximum grades are 5 per cent., and curves 2 deg. (Aug. 16, p. 582.)

Chicago Great Western.—An officer writes that the company has had estimates made of the cost of handling the suburban trade out of St. Paul by electricity. No official decision has been reached, but he does not think it probable that the change will be made.

Chicago, St. Paul, Minneapolis & Omaha.—It is said that an extension is to be built from Cumberland, Wis., 15 miles east to Rice Lake, Wis., where connection will be made with the Birch Lake Branch now building.

Chicago, Valparaiso & Michigan City (Electric).—Franchise has been granted in Indiana for this proposed line from Chicago, Ill., to Valparaiso, Laporte and a number of other towns south of the lower part of Lake Michigan in Indiana. The total distance projected is at least 150 miles.

Choctaw, Oklahoma & Gulf.—The $2,000,000 new capital for the extension to Amarillo, Texas, has been paid in, and work has been begun on the extension, and the part of the road which begins at the State line between Oklahoma and Texas and extends westward. It is thought that the new line will be ready for through trains about the first of May next. (Construction Supplement, March 8, 1901.)

Cincinnati & Licking River.—It is said that an eastern company has agreed to take the bonds of this road and that it will now be built. It is to run through the counties of Bracken, Mason, Robertson, Fleming, Rowan, Breathitt and Morgan in Kentucky, a total of about 100 miles. (Dec. 21, 1900, p. 851.)

Coahuila & Pacific.—It is said that this line, reported in the Construction Supplement of March 8 as being completed from Saltillo to Segin, Mexico, 75 miles, has now reached Parras, 100 miles from Saltillo. A subsidy of $750,000 in gold is said to have been given by the Mexican Government.

Cooperstown & Mohawk Valley.—The New York Railroad Commissioners have granted the application of this company for a franchise to build a standard-gage steam railroad 10 miles long, from Cooperstown to Springfield Center, in Otsego County. The company was incorporated in New York June 16, with a capital of $200,000. (June 21, p. 447.)

Cumberland River & Nashville.—A survey over the projected route of this new company, made in 1887, has been adopted, and location has begun. (Aug. 16, p. 582.)

Des Moines, Colfax & Eastern (Electric).—At a recent election held in Colfax, Iowa, the proposition of this company for a franchise received a large majority of the votes cast, as did also the proposition to vote a 3 per cent. tax to aid in building the road. The company proposes to build an electric line from Des Moines through Colfax to Newton, about 45 miles, paralleling the Chicago, Rock Island & Pacific.

Des Moines, Iowa Falls & Northern.—The dispute with the Chicago, Rock Island & Pacific over the right of way into Des Moines has been settled out of court, and it is stated that the new line will be located parallel to the Rock Island but a little north of its right of way. (July 3, p. 491.)

Garnavillo & Guttenburg.—This company was organized in Iowa, Aug. 20, with a capital stock of $60,000, to build a line from Guttenburg, a point on the Chicago, Milwaukee & St. Paul, in Clayton County, Iowa, to Garnavillo, about nine miles. The officers of the company are: Henry Brandt, President; Victor H. Stevens, Vice-President; Theodore Krasinsky, Secretary; and William F. Meyer, Treasurer, all of Garnavillo.

Grand Rapids, Kalamazoo & South Haven Traction.—This company has been incorporated under the general railroad law of the State of Michigan, with a capital stock of $800,000, to build a railroad from Grand Rapids through Kalamazoo to South Haven, about 100 miles. The motive power is to be "electricity or any other improved power," and the directors of the company are: John J. Patterson, J. R. Fell, and Martin Van Harlingen, of Philadelphia; J. Gust Zook, of Lancaster, Pa., and William H. Patterson, of Grand Rapids.

Havre de Grace Railway & Power (Electric).—It is said that building will be begun at once on this 16-mile line between Belair and Havre de Grace, Md. Connections will be made at the former point with the Maryland & Pennsylvania, and at the latter with the Baltimore & Ohio and Pennsylvania.

Hazlehurst & Southeastern.—This company has filed with the Secretary of State in Wisconsin an amendment to its articles of organization, providing for an extension from Hazlehurst, nine miles northeast to Tomahawk Lake. The Hazlehurst & Southeastern is a standard gage road open between Richardson & Marshall Lake, Wis., and Hazlehurst and Hazlehurst Junction, a total of 17 miles.

Illinois Central.—It is said that three tunnels between Memphis and Louisville are to be removed by change of grade. The short tunnel at East View, Ky., 55 miles below Louisville, is to be removed first.

Keokuk & Western.—The citizens of Des Moines are circulating a petition to this company, signed with several hundred names, to build the proposed three-mile spur to the new army post. (March 15, p. 194.)

Mexican International.—An officer writes that an extension is being built from Santiago Papasquiaro, on the extension north from Durango, to Santa Catarina. (Aug. 16, p. 582.)

Muscatine North & South.—It is said that this company will extend its line 22 miles south from Erick Junction, Louisa County, Iowa, to Burlington. Surveys have been made. The Burlington, Cedar Rapids & Northern covers this same territory.

New Brunswick Coal & Ry.—A contract has been let to James Barnes, M. P. P., for 15 miles of the projected line to connect the Central Ry. with the Newcastle coal fields at Grand Lake, N. B.

New Orange & Four Junction.—Surveys are reported on a line starting at Aldene, in the eastern part of New Jersey, and running about 17 miles east through Irvington, Hilton, Union and Springfield to Summit. It is said that extensions are planned as far as Pennsylvania and perhaps farther.

New York, New Haven & Hartford.—Plans have been filed with the selectmen of North Attleboro, Mass., for a new electric road to Providence, 14 miles.

Northern Pacific.—An officer writes that location is now in progress on a proposed extension from Mabton, Wash., about nine miles southwest towards Bickleton. Contracts are to be let in the next few days. The general character of the construction is extremely light and there are no important bridges, trestles or tunnels.

Pennsylvania.—Work is reported begun on the extension of the Turtle Creek Valley, from Export 10 miles east to Saltsburg, Pa., where connection is to be made with the West Penn Division. This extension furnishes to the northern part of Westmoreland County a route to Pittsburgh, 20 miles shorter than that formerly used.

Richmond, Union City & Portland (Electric).—This company has been incorporated in Indiana, to build an electric road between the points named, a distance of about 50 miles northwest. The Grand Rapids & Indiana already connects Richmond with Portland. The capital stock is $50,000, with the privilege of increasing to $2,000,000.

San Pedro, Los Angeles & Salt Lake.—It is said the company is now ready to let contracts for the first 30 miles of this new road, between Los Angeles and Pomona, and that the cost of the section will approximate $250,000. The contract for the second division will be let as soon as the necessary rights of way have been secured. The road is to be equipped with 75-lb. rails throughout the entire length. (March 29, p. 230.)

Twin City, Pierre & Black Hills.—It is said that financial arrangements have been concluded for a railroad in South Dakota to run about 200 miles southwest from Aberdeen to the Black Hills, with Rapid City for its western terminus. The Missouri River is to be crossed at Pierre. The plan is to have the new road eventually become part of a short line from the Northwest to Denver and California. The estimated cost is $20,000 a mile, and it is said that there is prospect of immediate building as far as Pierre.

Union Pacific.—It is reported that the Union Pacific and Short Line will build a cut-off from Cumberland, Wyo., the southwest terminus of the Wyoming & Western, a branch of the Oregon Short Line running out from Kemmerer to Aspen tunnel on the Union Pacific. The distance between the two points is about 26 miles, and a down grade will be secured to the tunnel. Coal will be hauled over this cut-off into Ogden and Salt Lake at a great saving over the present plan of hauling the fuel north to McCammon Junction and then back south again.

Vining & Coleman.—Contracts are said to have been let for 20 miles of this road in Coleman County, Texas. It is said that the company will ultimately extend the line down the Colorado Valley to Austin, and perhaps beyond. (Construction Supplement, March 8, 1901.)

RAILROAD NEWS.

Baltimore & Ohio.—It is said that $25,000,000 of new stock is to be issued to finance the acquisition of the Cleveland, Lorain & Wheeling. Plans for the reorganization of the Pittsburgh & Western are to be announced in the fall.

Buffalo, Rochester & Pittsburgh.—The annual report for the fiscal year ending June 30, shows gross earnings $5,830,618, an increase of $818,483 over the preceding year. The net income is $1,215,438, from which $530,134 has been deducted for extraordinary expenses and special appropriations for construction and equipment: $126,000 car trust bonds have been cancelled during the year, and an additional issue of $1,000,000 in 4½ per cent. gold bonds has been decided upon to provide for new rolling stock.

Houston & Texas Central.—The stockholders of the Central Texas & Northwestern and the Fort Worth & New Orleans have authorized the sale of their roads to the above company, forming part of a general plan of the Houston & Texas Central to absorb a number of small tributary lines.

Illinois Central.—In the year ending June 30, the net earnings were $11,058,668; an increase of $1,316,096 over the previous year, with an increase of 370 miles of track. The gross receipts from traffic were $36,900,460, against $32,611,967 of the previous year; an increase of $4,288,493.

International & Great Northern.—Bonds for the new line which is being built from Fort Worth to Spring, Texas, on the Gulf Division, are to be issued under the company's present authorized first and second mortgages, at the rate of $10,000 a mile under each mortgage.

Lake Erie & Detroit River.—This company has arranged for an extension of the lease of the London & Port Stanley for 30 years from the present time, on the following terms: The rental, now $12,000 per year, is to be increased to $17,500 for the 13 years remaining of the original lease, and after that expires, $20,000 is to be paid for the 17 years remaining.

Lehigh Valley Traction.—This company has bought from the Quakertown Traction Co. the line from Quakertown to Perkasia, Pa., for use as part of the proposed road between Philadelphia and Allentown. There is an outstanding mortgage of $150,000 on the property of the Quakertown Co.

Louisville, Anchorage & Pewee Valley Electric.—A mortgage has been filed to the Cincinnati Trust Co., as trustee, to secure $350,000 of 30-year 5 per cent. bonds, covering the 14 miles of track proposed, with franchises and equipment.

Maine Central.—The report for the year ending June 30, shows that the gross transportation earnings were $5,868,546. After deducting operating expenses, $3,962,338, there remained $1,906,207 for net income from transportation, and $1,998,598 for total net income. Deducting from this fixed charges and sinking fund payments, also $200,000 representing the capital stock of the Knox & Lincoln, there was left as balance available for dividends $374,669. The surplus for the year after dividends to the extent of $298,554 were paid, was $76,115, as against $84,146 for the previous year.

Nashville & Clarksville.—The opposition to Jere Baxter's road in Clarksville has filed a bill of injunction, with 24 reasons therein stated why the recent election at which the city subscribed for bonds of the road, should be set aside as invalid. (Railroad Construction, Aug. 16, p. 582.)

Northwestern Elevated.—It is said that the Evanston Line of the Chicago, Milwaukee & St. Paul, from Wilson avenue, Chicago, to Evanston, is to be turned over to the Northwestern Elevated.

Omaha, Kansas City & Eastern.—This road has been ordered sold under foreclosure, and it is said that the purchaser will be the Chicago, Burlington & Quincy. The Omaha, Kansas City & Eastern runs from Pattonsburg to Trenton, Mo., and leases the Quincy, Omaha & Kansas City, which runs from Trenton to West Quincy, Mo.

Pittsburgh & Western.—The U. S. Circuit Court has ordered this property sold at Allegheny City, Oct. 9, in foreclosure of mortgages held by the Pittsburgh, New Castle & Lake Erie: T. H. Nevin and others, trustees, and the Mercantile Trust Co., of New York. The sale will include the leases on other lines held by this company.

Pittsburgh, Cincinnati, Chicago & St. Louis.—The report for the seven months ending July 31 shows gross earnings of $11,395,945, an increase of $546,045 over the same period last year. After deducting operating expenses and interest on bonds, etc., there remains as profit $893,306, as opposed to $473,379 last year.

Plant System.—An officer writes that at the September meeting the following lines, which at the present time are owned and controlled by the Plant System, will be absorbed under the name of the Savannah, Florida & Western; Ashley River; Green Pond, Walterboro & Branchville; Abbeville Southern, and Western Alabama.

Railways Company General (Michigan).—The sale of the Michigan Traction System by this company was not made to the Everett-Moore Syndicate, as reported, but it is said to the Boland Syndicate, of New York. The latter is building the line from Ann Arbor, Mich., through Jackson and Marshall to Battle Creek, 78 miles, which is to be called the Jackson & Suburban. This will connect at Battle Creek with the interurban line of the Michigan Traction Co., which is in operation between that point and Kalamazoo. These two systems, with the Detroit, Ypsilanti & Ann Arbor, will make a continuous line nearly 150 miles long between Detroit and Kalamazoo. (Aug. 16, p. 582.)

Rutland.—This company and the Bennington & Rutland have been consolidated by a vote of the stockholders of the latter, confirming a similar action taken several weeks ago by the stockholders of the Rutland.

St. Louis & San Francisco.—The capital stock is said to have been increased from $20,000,000 to $80,000,000, to provide for the purchase of the Kansas City, Fort Scott & Memphis, which is soon to be absorbed. (June 28, p. 474.)

Savannah, Florida & Western.—See Plant System, above.

Schenectady Ry.—First mortgage bonds to the extent of $1,250,000 have been sold to N. W. Harris & Co., to provide for extensions and improvements, including double track between Schenectady and Albany, and a new line to Troy.

Southern Missouri & Arkansas.—An officer writes that new securities aggregating $650,000 par value bonds, and a like amount of stock, will be issued to provide for the extension from Poplar Bluff, Mo., to Pocahontas, Ark., 51 miles. The extension is to be laid with 65 and 75-lb. rails, and the grade is to be 2 per cent. Modern steel bridges are to be built over the principal streams.

White River, Lonoke & Western.—This road has been sold at Lonoke, Ark., under decree of the Chancery Court, to pay certain debts; and was bought by A. N. Johnson, trustee, for $16,500. The road, as projected, was to extend from Wooley to White River, Ark., but up to the present time is only completed between Wooley and Lonoke, 16 miles. It is standard gage and laid with 35-lb. rails.